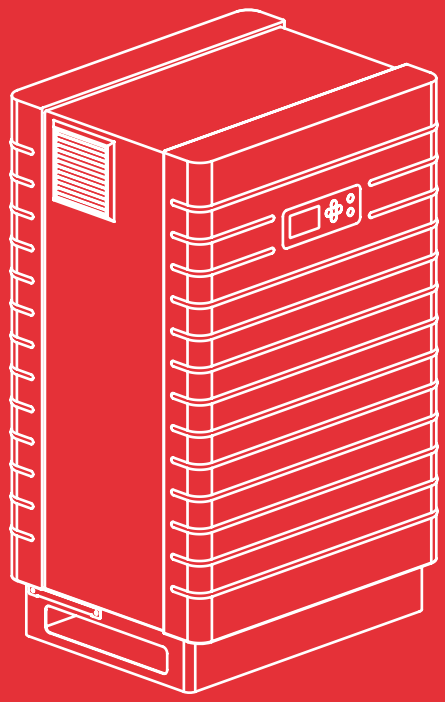
MANUAL



User Manual
Sunways Solar Inverter

PT 30k

english

EN

sunways
Photovoltaic Technology

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Introduction

Thank you for purchasing a PT Series Sunways Solar Inverter, an innovative, high-quality product with unique features and a consistently high efficiency. This Solar Inverter is equipped with HERIC® topology and innovative PT circuitry and enables operation on a large number of silicon modules – as accustomed from Sunways – without the use of a transformer.

This user manual contains explanations on using the Sunways Solar Inverter. You will learn to recognise the many possibilities of the Solar Inverter. Information is provided on safety, installation, commissioning, operation and system monitoring.

Please observe the safety precautions exactly to ensure increased safety at the operating site of the Solar Inverter.

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1 Product Description

1.1 Proper use

The Sunways Solar Inverter PT is the link between your solar generator and the public power grid. The energy from the connected solar generator is converted to grid-compliant AC current and fed into the grid. Solar modules which require fixed earthing of the positive or negative terminal cannot be operated with the PT Solar Inverter. If in doubt, always ask your module manufacturer whether the modules can be used without earth reference.

1.2 Function description

Conversion from direct into alternating current
The PT Solar Inverter converts the direct current produced by the solar generator into alternating current. The alternating current is then fed into the public power grid as a three-phase current.

Operating and display elements
- Various interfaces are available for system configuration and monitoring:
- Operator panel (LCD display and keyboard) for displaying operating and status values or for inputting system parameters
- Operating LED
- Integrated web server for display and configuration via a web browser

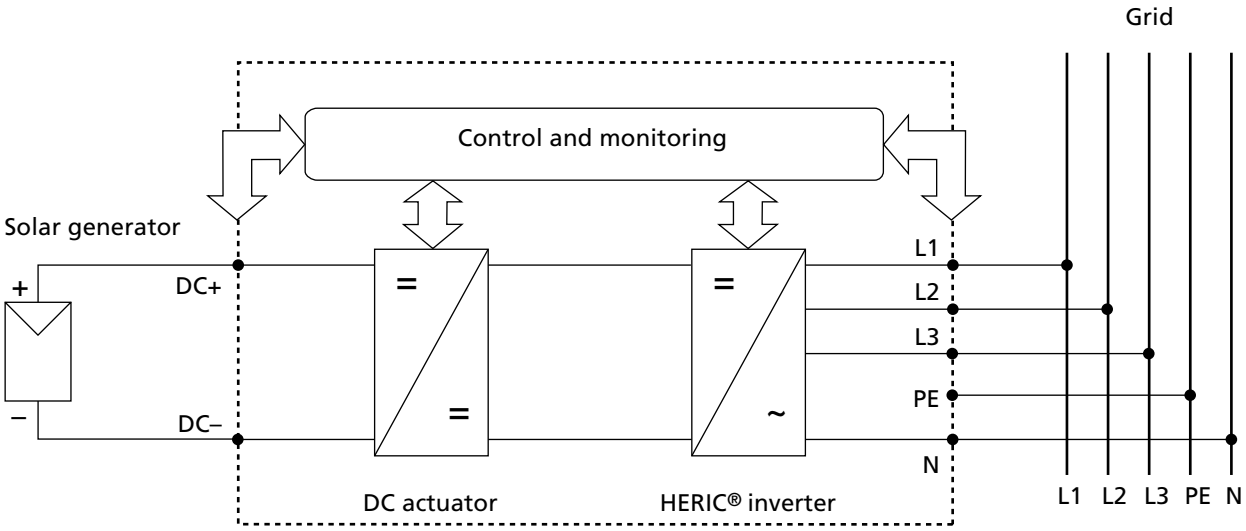
Interfaces
- Bus interface for connecting a Sunways Modem, analog modem, ISDN modem or GSM/GPRS modem
- Ethernet interface for connecting a PC or for integration in existing networks
- CAN bus interface for interconnecting several Solar Inverters
- S0 pulse output for controlling large displays
- Alarm relay for realising simple monitoring locally
- Interface for connecting a irradiation and temperature sensor

Data logging
The PT Solar Inverter is equipped with internal data logging for recording and saving system data:
- 5-minute mean values of voltages, currents, output, temperature and irradiance (if sensor is installed)
- 5-minute, daily, monthly and annual energy yield values
- Memory for malfunction messages

Grid monitoring
The PT Solar Inverter assumes the task of grid monitoring for the protection of the device and persons. In case of abnormal grid conditions, feeding is immediately interrupted and the Solar Inverter disconnects from the grid.

Solar Inverter configuration
The basic configuration of the PT Solar Inverter is shown in the block diagram. The solar generator voltage connected to the inverter input is initially adapted by the DC actuator and then converted to alternating current by the high-efficiency HERIC® inverter. The AC connection is made with 5 wires due to the 3-phase feed and passive grid monitoring.

Block diagram



1.3 Integration in solar system

Solar generator configuration

The technical data of the selected solar generator must be within the Solar Inverter's specifications (see Technical Data). Incorrect dimensioning can lead to reductions in the yield and to destruction of the device.

The Sundim design program from Sunways can be used for this purpose. Sunways Sundim can be found on the enclosed CD-ROM or on our website at www.sunways.de.

Be sure to take the following points into account before planning your system:

- Watch the celestial alignment of the modules. In Central Europe a maximum yield is achieved with a module tilt of 30° to the horizontal and direct south orientation of the solar generator field.

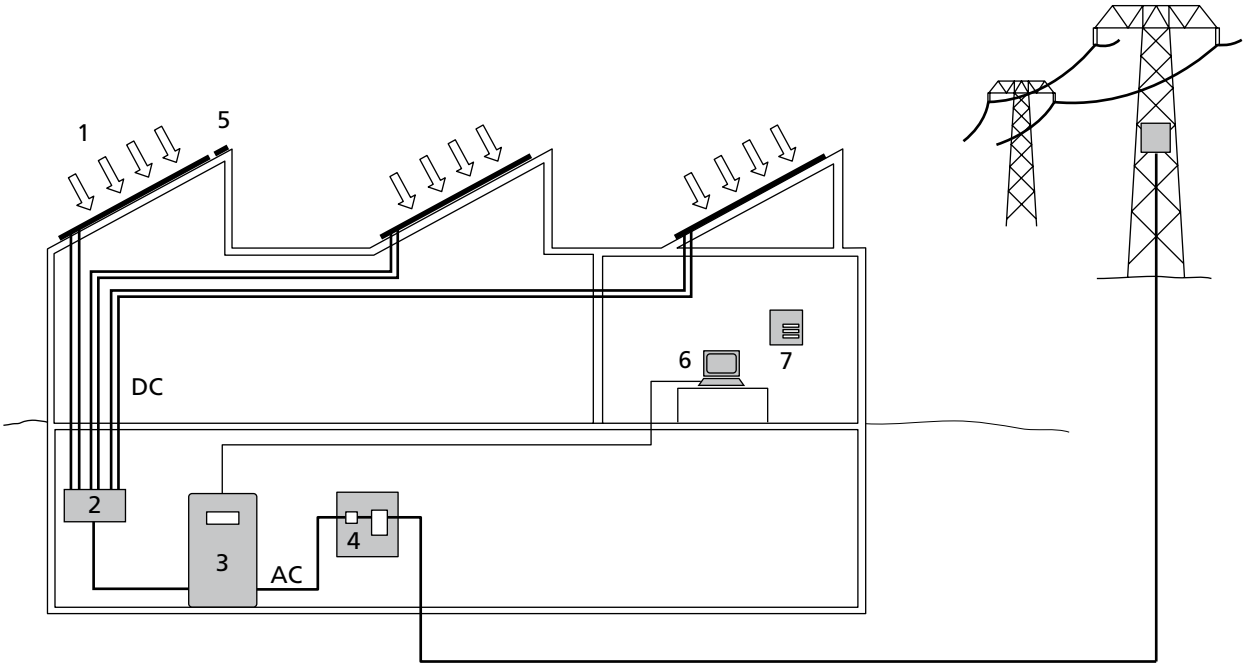
- The output of the cells decreases as the module temperature increases. Install your solar generator with sufficient ventilation from behind.

- Check your solar generator approx. every three years for soiling. This occurs especially on the lower edge of the modules and forms a veil that cannot be washed off even by heavy rain. Reduced yield can be prevented by cleaning with a wet cloth or a brush.

- Avoid shading of individual modules or solar cells in your system. This can lead to major reductions in yield.

Standard components of a solar system

Depending on the recommendations of your PV planning expert, your PV system consists of the following components:

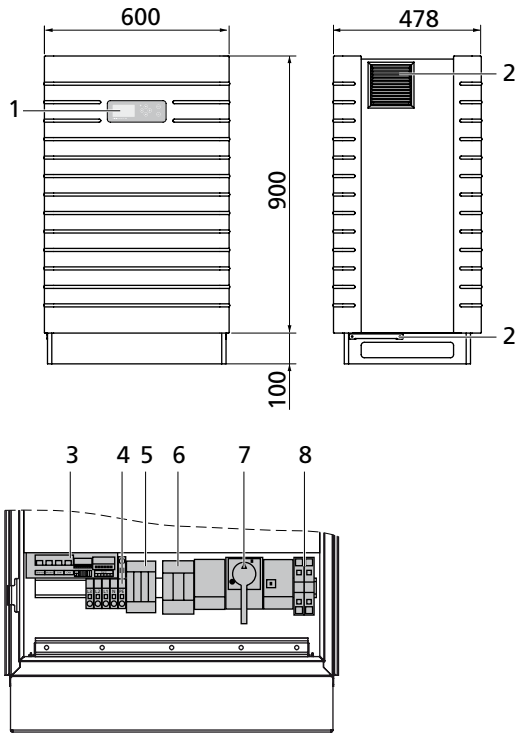


1 Solar generator
2 Generator connection box (string box)
3 Solar Inverter with integrated DC load break switch
4 Mains fuse and energy meter

Options

5 Irradiance sensor with integrated temperature sensor
6 PC for system monitoring
7 Large display

1.4 Assembly description



1 Operator panel with LCD display, operating LED and keyboard
2 Filter
3 Communication interfaces
4 AC connection
5 AC overvoltage protection Cat. II
6 DC overvoltage protection Cat. II (optional)
7 DC load break switch
8 DC connection

1.5 Scope of delivery

The delivery consists of:

- Sunways Solar Inverter of the PT series
- CAN terminating resistor connector (connected)
- Ethernet cable, 3 m (CAT 5e, 1:1)
- Control cabinet key
- Manual
- Service-folder
- CD-ROM, including: Sunways Sundim design program, product and service information

Checking delivery
Before shipment our products are checked for proper condition. Despite careful, recyclable packing, transport damage may occur, for which the transport company is generally responsible.

Please check the delivered Solar Inverter thoroughly.

Should you discover damage to the packing or the Solar Inverter, please inform the transport company immediately. Your specialist dealer will be happy to provide assistance if required. A possible damage report must always be received by the transport company in writing at the latest seven days after receipt of the goods.

2 Safety Precautions

2.1 General safety precautions

Follow the instructions in the operating manual.
Safe handling and trouble-free operation of the PT Solar Inverter requires knowledge of the basic safety precautions.

This user manual contains the key information on operating the system safely.

Each person concerned with the installation, commissioning, maintenance and operation of the Solar Inverter must have read and understood the entire user manual, and in particular the chapter entitled Safety Precautions.

In addition, the rules and regulations for accident prevention applicable for the operating site/plant must be observed.

Dangers when handling the PT Solar Inverter
The Solar Inverter has been built in accordance with the latest rules of technology and the recognized safety rules and may only be used

- for its intended use
- and in a safe state.

Improper use may lead to dangers to the life and limb of the user or others, or can adversely affect the system or other property.

In case of malfunctions which can impair safety, the system must be shut down immediately and secured against being switched on again. The malfunction must then be eliminated immediately.

Warranty and liability

The Sunways AG „General Terms and Conditions of Sale and Delivery« always apply. Warranty and liability claims for personal injury or damage to property are excluded, if they were caused by one or more of the following:

- Improper use of the Solar Inverter
- Improper installation, commissioning, operation and maintenance
- Operation of the Solar Inverter with defective and/or non-operational safety and protective equipment.
- Failure to observe the information in the user manual regarding installation, commissioning, operation and maintenance
- Unauthorised constructional modifications
- Insufficient monitoring of wearing parts
- Improperly conducted repairs
- Emergencies caused by external influence or force majeure.

2.2 Explanation of symbols and warnings

To help you quickly understand this manual and safely use the Solar Inverter, the following warnings and symbols are used.

Warnings and symbols used in this user manual

DANGER

Dieses Symbol weist auf eine unmittelbar drohende Gefahr hin, die – wenn die Sicherheitsbestimmungen nicht befolgt werden – Tod, Körperverletzung oder schwere Sachschäden zur Folge haben wird.

Extreme danger from electric shock!

This symbol indicates an immediate danger from electric shock which will result in death, injury or serious damage if the applicable safety regulations are not followed..

CAUTION

This symbol indicates an immediate danger which can result in damage if the applicable safety regulations are not followed.

Symbols used in this user manual

Information

This symbol indicates important information which contributes to a better understanding of the Solar Inverter.

Warnings and symbols on device

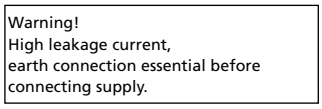
The following warnings on the housing of the Solar Inverter point out dangers. Always observe the warnings exactly.

This symbol indicates that the user manual must be read and understood before putting the device into operation..

IMPORTANT

Hot surface. The housing can heat up during operation.

The device must be disconnected from the mains supply and from the PV generator before opening the housing. The device still carries life-threatening voltage for approx. five minutes internally and at the connection terminals of the PV generator following disconnection from the PV generator. The energy storage capacitors are not completely discharged until after this time. You must wait at least five minutes after disconnecting the device from the mains supply and from the PV generator before opening the device.



WARNING!

High leakage currents. Be sure to make an earthing connection before connecting the power supply circuit (AC system).

2.3 Basic safety measures

Electrical work on the Solar Inverter must be conducted by a qualified electrician while observing the VDE regulations, national and other regulations.

The Solar Inverter may only be opened by persons authorised by Sunways AG to do so.

When circuit breakers are tripped, the fault cause must be determined and eliminated before returning the device to operation.

Check electrical equipment regularly.

Retighten loose connections.

Replace damaged lines/cables immediately.

2.4 Safety scheme

The following parameters are monitored and displayed continuously and simultaneously by the inverter controller:

- DC overvoltage
- Overvoltage L1, L2, L3 > 10%
- Overvoltage L1, L2, L3 > 15%
- Undervoltage L1, L2, L3
- Stand-alone operation
- Overfrequency L1, L2, L3
- Underfrequency L1, L2, L3
- Surge error (brief overvoltage L1, L2, L3)
- DC share in AC current L1, L2, L3
- AFI residual current jump > 30 mA
- AFI residual current > 300 mA
- Overtemperature of heat sink, interior, chokes

When a malfunction occurs, feeding is immediately interrupted and the Solar Inverter disconnects from the grid by triggering the mains contactor.

The potential-free alarm relay is switched (except for grid undervoltage L1).

In addition, the following protective equipment in accordance with overvoltage category II and III is provided on the grid and on the solar generator side:

- Grid-side varistors
  These protect the power semiconductors in case of high-energy, short-term voltage peaks in the grid and dissipate the energy in the choke in case of a grid disconnection.

- Overvoltage protection on the generator side
  Optional protection (Class II) against atmospheric overvoltages (e.g. caused by remote strikes during thunderstorms.

3 Installation

3.1 Mechanical installation

Requirements for installation location

DANGER

- The Solar Inverter may not be installed in rooms subject to explosion hazards.
- The Solar Inverter may not be exposed to caustic gases.
- No combustible materials may be stored within 3 metres of the Solar Inverter.

Mechanical load-bearing capacity

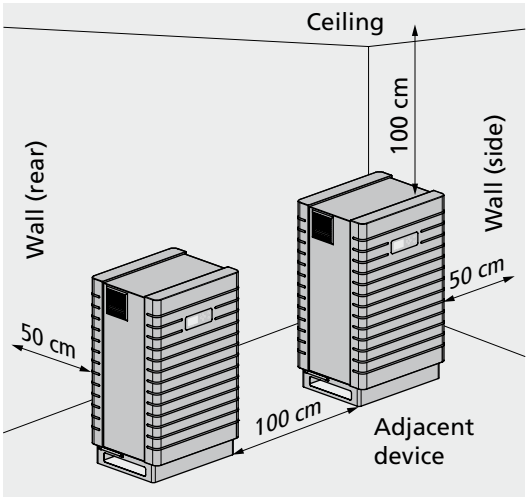
- Note during installation that the Solar Inverter weighs 155 kg. The installation surface must be firm and able to carry this weight in the long term.

Thermal interaction

- The installation surface must consist of flame-retardant material (not suitable: surface of wood or plastic; suitable: e.g. concrete), as the frame of the Solar Inverter can heat up to a maximum of 85°C
- A minimum distance of 1m to other devices, cabinets, ceilings, cable ducts, etc. must be maintained to the sides of the housing. A minimum distance of 0.5 must be maintained between the rear panel of the Solar Inverter and the wall (see Fig.).
- The Solar Inverter must be installed upright to enable adequate free convection.
- Solar Inverters may not be stacked in order to prevent excessive warming.
- If several PT Solar Inverters are operated in an enclosed space, adequate fresh air supply must be ensured. Larger systems should be configured in collaboration with Sunways at the design stage.
- The ambient temperature must be within the range -25 to +40 °C. At ambient temperatures above 40 °C the inverter automatically reduces its output.
- The Solar Inverter should not be exposed to direct sunlight to protect it from unnecessary external warming.

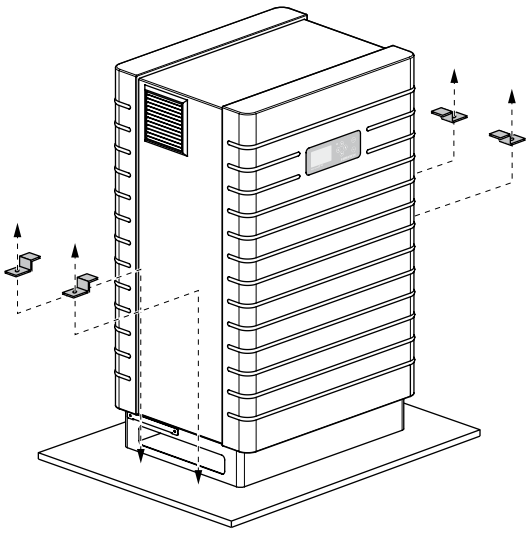
Protection against moisture and foreign bodies

- The PT Solar Inverter is supplied with IP 42 protection rating for indoor installation. The optional protection type IP 54 allows installation indoors and in roof-covered areas outdoors, however the Solar Inverter may not be directly exposed to rain.

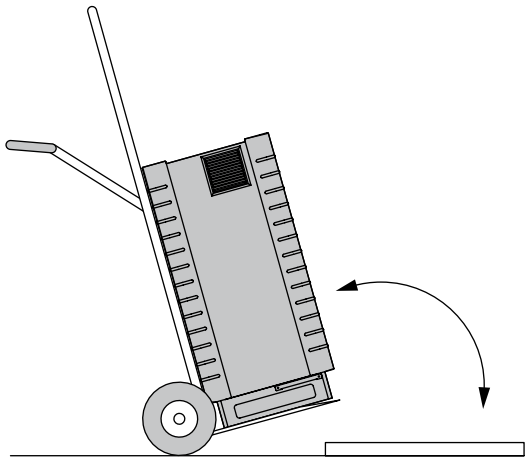


Installation
Proceed as follows to install the Solar Inverter:

1. The Solar Inverter is attached to the pallet with retaining claws. Remove the retaining claws.



2. Use a trolley for transporting the device to the installation site.



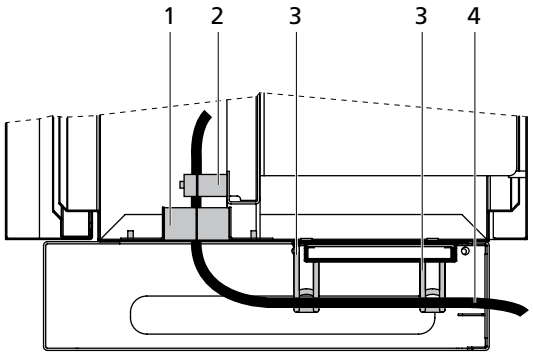
3. Use the retaining claws to secure the Solar Inverter on the installation surface.

3.2 Electrical installation

Cable installation

Extreme danger from electric shock!

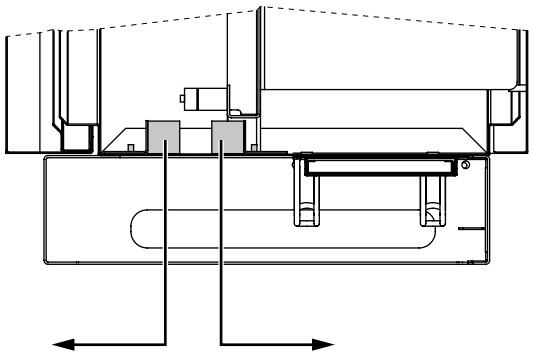
- Touching live parts can result in death.
- All electrical work must be carried out by a qualified electrician while observing the VDE regulations, national and other regulations.



Sectional diagram.
1 Bars with foam rubber
2 Strain relief device
3 Cable brackets
4 Cable

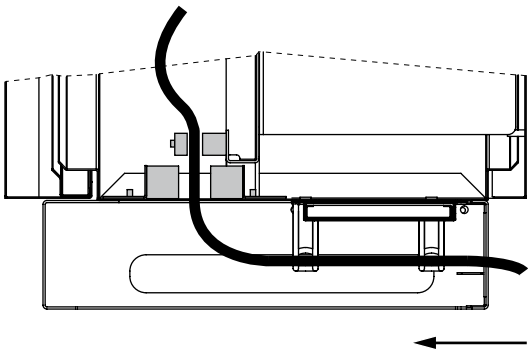
Proceed as follows to install the cables:

1. Release the bolts on the bars and push them apart.



2. Route the cable at the rear of the Solar Inverter via the cable brackets.

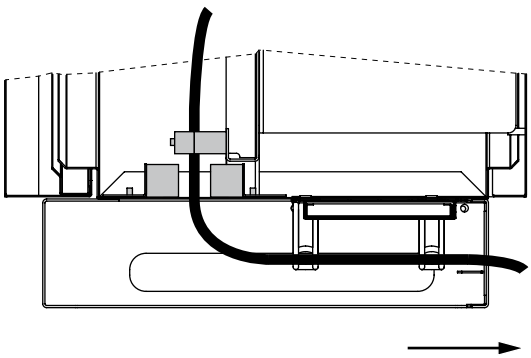
3. Introduce the cable in the opening between the two bars.



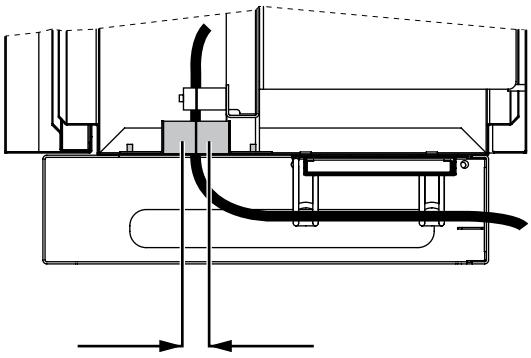
4. Open the strain relief device and guide the cable through it.

5. Install the cable (see Solar generator connection and Grid connection sections).

6. Pull back the cable slightly and attach it with the strain relief device.



7. Push the bars back together and secure them with the bolts.



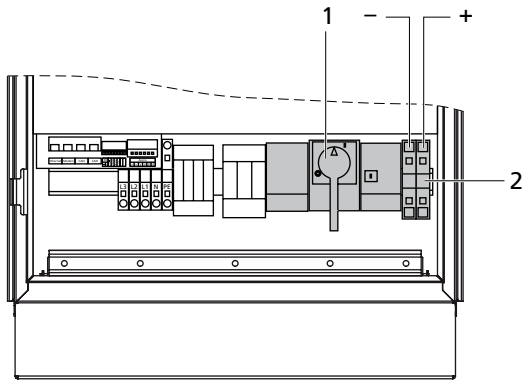
Solar generator connection

Extreme danger from electric shock!

- Touching live parts can result in death.
- All electrical work must be carried out by a qualified electrician while observing the VDE regulations, national and other regulations.
- Execute the direct current wiring in accordance with the system dimensioning of your planning expert.
- Prepare all solar generator cables before connecting the solar generator to the Solar Inverter.
- Check each solar generator string for proper operation with an open-circuit voltage and short-circuit current measurement.
- Check the rating plate on the Solar Inverter to ensure that it is approved for the maximum solar generator voltage.
- The positive and negative lines must be kept electrically separate from the earth potential.
- Touchable, live parts of the solar generator (e.g. metal frame, carrying structure, etc.) should be earthed (connection with PE.)
- Check the solar generator for freedom from short-circuits to earth.
- Before connecting the solar generator to the Solar Inverter, the integrated DC load break switch must be opened (position 0).
- After the PV solar generator is connected to the Solar Inverter and the DC load break switch is switched on, the direct generator voltage is present internally.
- Always separate the solar generator side first by opening the DC load break switch and then the grid connection by switching off the corresponding mains fuse.

Overview
The solar generator can be directly connected to the Solar Inverter with a string. Use the DC terminals accessible from inside for the connection.

- The solar generator strings must be identically dimensioned and comply with the specifications of the Solar Inverter.
- No external DC load break switch is required. A DC load break switch as required in accordance with DIN VDE 0100-712 is integrated in the Solar Inverter.



1 DC load break switch
2 Solar generator connection

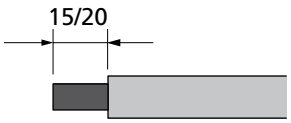
Installation

Extreme danger from electric shock!

- Touching live parts can result in death.
- All electrical work must be carried out by a qualified electrician while observing the VDE regulations, national and other regulations.
- Ensure that the cables are installed securely
- Any kind of soiling (dust, moisture, etc.) has a negative effect on the terminals with regard to function over the intended period of use.
- We recommend DC connection cables with cross sections between 16 mm² and 35 mm².
- The cables must be double-insulated and UV-resistant («Radox» cables from Huber & Suhner, for example, are suitable).

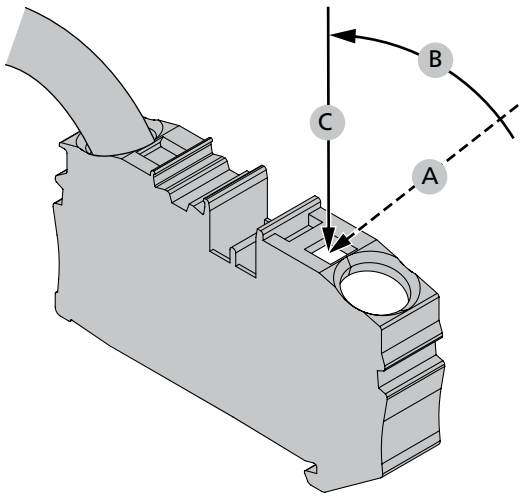
The following sequence must be observed during assembly:

1. Strip the voltage-free line and the cable ends.



with end splice 15 mm
without end splice 20 mm

2. Apply a screwdriver at a slant (A) at the locking apply and push it in until it is vertical (B) and locks into place (C).



CAUTION

Please avoid squeezing the cable insulation or the end splice. Improper connection may damage the equipment!

3. Introduce the stripped cable into the cable clamp and push the screwdriver forward into the original position.

String box

The string box enables connection of up to 8 or 12 solar generator strings to DC bus line that can be connected directly to the Solar Inverter.

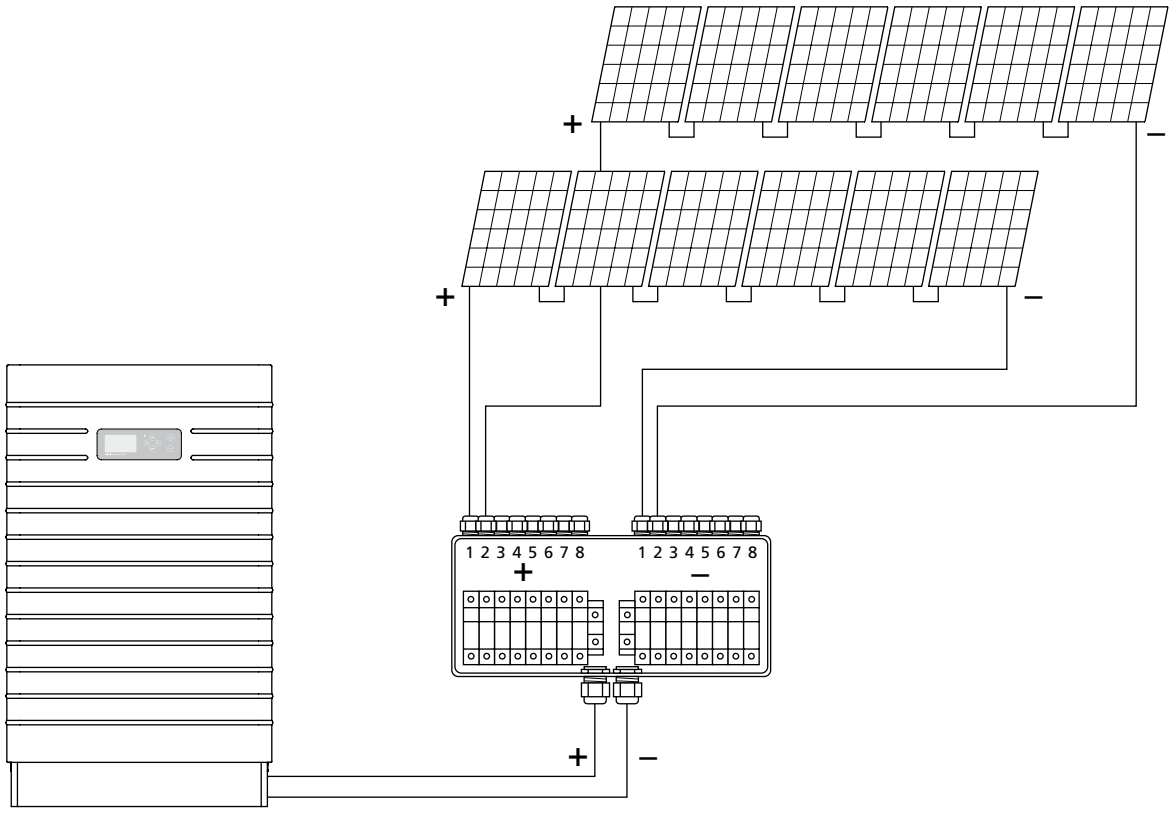
The string box has protection rating IP65 and can therefore be installed near the solar generator. The string box can be equipped with fuses or dummy sleeves.

String box options

The Sunways string box is available with the following options:

- for up to 8 or up to 12 PV strings
- with/without DC overvoltage protection
- with/without DC load break switch
- fuses for different currents
- Dummy sleeves

Further information can be found in the Solar Inverter Accessories section at www.sunways.de.



Grid connection

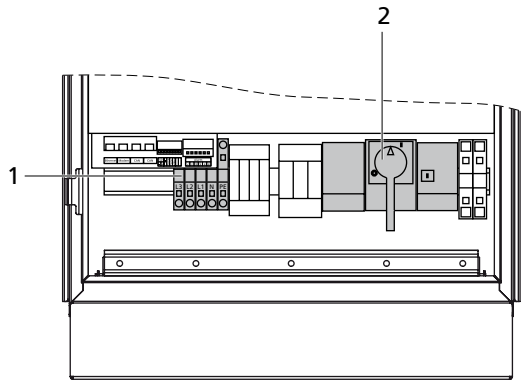
Extreme danger from electric shock!

- Touching live parts can result in death.
- All electrical work must be carried out by a qualified electrician while observing the VDE regulations, national and other regulations.
- Note the AC terminal assignment. An incorrect assignment can result in the device being destroyed.
- No consumers may be connected to the supply line from the Solar Inverter to the mains fuse.
- Always separate the solar generator side first by opening the DC load break switch and then the grid connection by switching off the corresponding mains fuse.

If the voltage on the AC connection exceeds the permissible value due to a long line length or an insufficient cable cross-section, the Solar Inverter will be disconnected from the grid. In power grids with a low output and a high solar generator output, this can lead to individual Solar Inverters being switched off and then on again several times.

Overview

The grid connection of the Solar Inverter is made via 5 wires (L1, L2, L3, N, PE) and an AC terminal strip on the underside of the device. Feeding is always three-phase via the AC terminal.

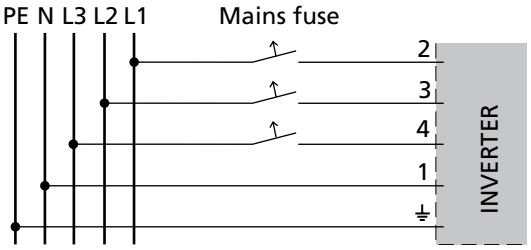


1 AC connection
2 DC load break switch

A suitable circuit breaker is recommended as a line protection element in the grid feed direction:

- PT 30k: 3 x 63 A with slow-blow characteristic C (for terminal cross-sections >= 16 mm²)

A three-pin circuit breaker or individual fuses can be used. Suitable fuse protection must be provided to match the installation method. Further details can be found in the Appendix.



- A three-phase meter must be used
- Some grid operators require the use of a reverse-current-capable meter.

Installation

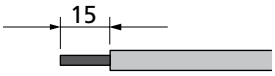
Extreme danger from electric shock!

- Touching live parts can result in death.
- All electrical work must be carried out by a qualified electrician while observing the VDE regulations, national and other regulations.
- Note the AC terminal assignment. An incorrect assignment can result in the device being destroyed.
- Ensure that the cables are installed securely.

- Any kind of soiling (dust, moisture, etc.) has a negative effect on the terminals with regard to function over the intended period of use.
- We recommend AC connection cables with the following cross sections.
  16 mm² solid copper cable
  16 mm² flexible copper/non-metallic sheathed cable

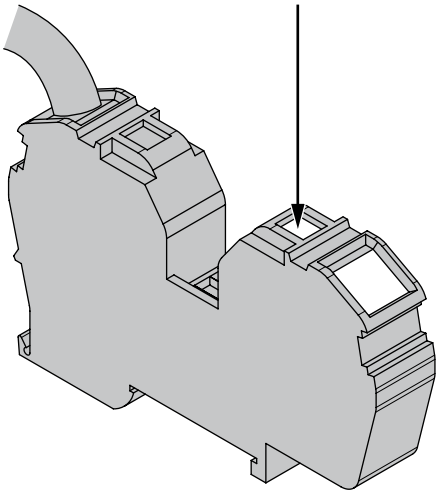
The following sequence must be observed during assembly:

1. Strip the voltage-free line and the cable ends.



   with end splice 15 mm
   without end splice 20 mm

2. Introduce a screwdriver vertically into the locking device.



CAUTION

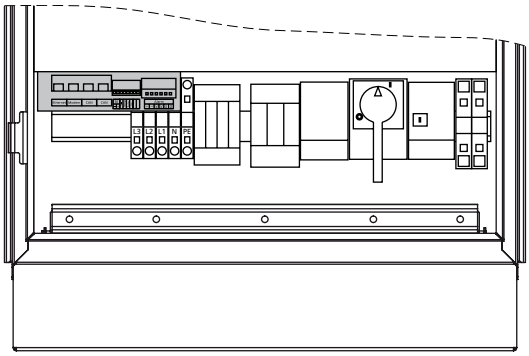
Please avoid squeezing the cable insulation or the end splice. Improper connection may damage the equipment!

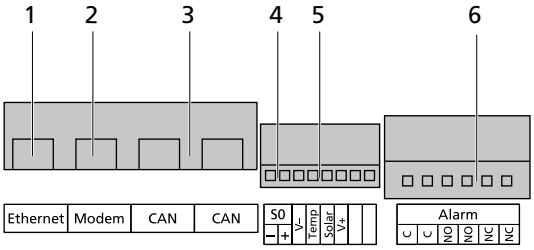
3. Introduce the stripped cable into the cable clamp and pull the screwdriver out again.

3.3 Installing the communication system

Interface overview

The communication interfaces are located above the AC terminals.

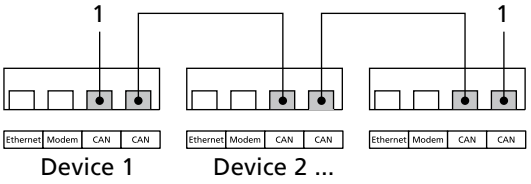




1 Ethernet connection
2 Modem connection
3 CAN bus
4 S0 interface (pulse output, e.g. for large display)
5 Connection for temperature and irradiance sensor
6 Connection for alarm relay

Networking Solar Inverters via CAN bus

The Solar Inverters can be networked with each other via the CAN bus interface.



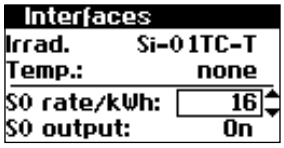
1 Terminating resistor connector

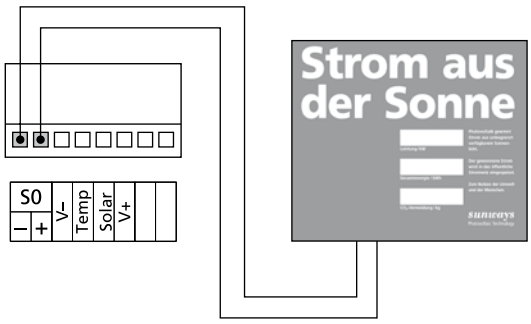
- Use the Ethernet cable provided to network the Solar Inverters with each other.
- Connect a terminating resistor connector (1) at the first and last Solar Inverter in the series. The pluggable terminating resistor connectors are included with the device.
- The total length of the CAN bus network may not exceed 100 m.
- Up to 99 PT and AT series devices can be networked via a CAN bus.

S0 interface

The S0 pulse output enables, for example, the connection of a large display (Sunways Display) for displaying the momentary output, the energy yields and the CO_2 reduction.

You can use the S0 interface on the master if you want to transmit the entire line yields as a sum to a large display.
The S0 interface is adjusted via the display on the inverter. Go to the menu «Settings – Network – Interfaces».





- Please note that the maximum pulse rate may not exceed 15 pulses/sec. Calculate the pulse rate depending on the size of the solar system using the following formula:

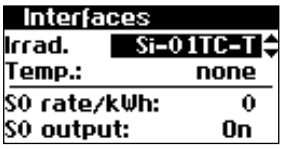
  Pulse rate [pulses/kWh] = 50,000/system size [kWp]

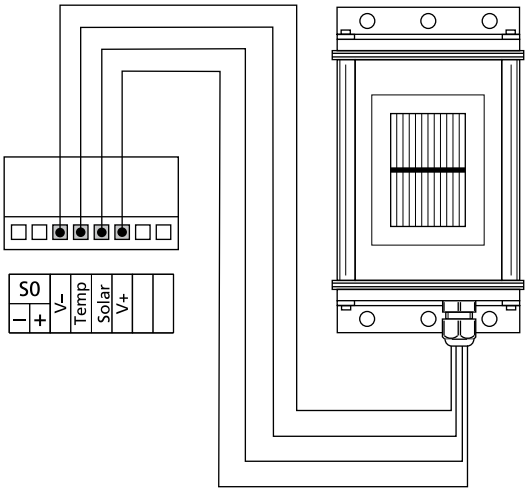
- The pulse rate must be set on your Solar Inverter and on the large display.

Temperature and irradiance sensor

The optional addition of an irradiance sensor (model Si-01TC-K from Ingenieurbüro Mencke & Tegtmeyer) with an integrated PT-100 temperature sensor for temperature measurement enables the acquisition of irradiation data and the corresponding module temperature and storage in the internal data memory as a 5-minute mean value. This additional measuring device helps analyse the system output. Based on the values, any errors on the PV generator, e.g. shading or failure of solar cells, can be detected.

The sensor is activated via the display. In the menu «Settings - Network - Interfaces» you can select the sensor type in the «Irrad.» and «Temp.» field.





Assignment of sensor connection

Sensor connector pin assignment	Sensor connection designation	Solar Inverter connection
Pin 1	Plus signal temperature	Temp
Pin 2	Plus signal irradiance	Solar
Pin 3	Reference earth	V-
Pin 4	Plus connection for supply +5V	V+

Connecting the alarm relay

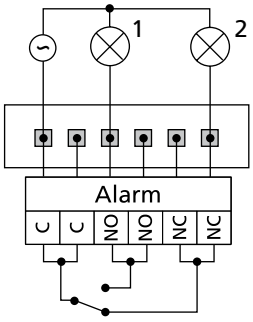
The Solar Inverters are equipped with a potential-free alarm relay as standard. The relay can be designed as a make-contact element or as a break-contact element and is actuated for all malfunctions signalled by the device. This ensures a faster, more reliable indication of a possible fault in the PV system on site. For PV systems with several Solar Inverters, the individual relays can be switched in parallel and connected via a common indicator lamp.

The master also signals faults from other devices in the CAN network via the alarm relay. It is therefore sufficient for simple alerting to connect the alarm relay of the master.

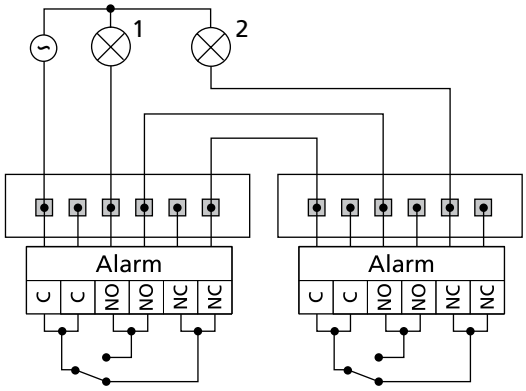
CAUTION

The alarm relay is designed for 230 V/2 A. Higher outputs/voltages can result in the relay being destroyed. The connected signalling device must be fused separately. The terminals are intended for a cable cross-section of 0.2 mm^2 to 1.5 mm^2. When dimensioning the cross-section, also take the current consumption of the connected signalling device into account.

Wiring diagram for a single device



Wiring diagram for several devices



1 Indicator lamp, red
2 Indicator lamp, green

The Solar Inverter is supplied by the feed-in phase from the AC grid. If the feed-in phase fails the alarm relay cannot switch, even in the event of a fault.

4 Commissioning

4.1 Connecting and disconnecting the Solar Inverter

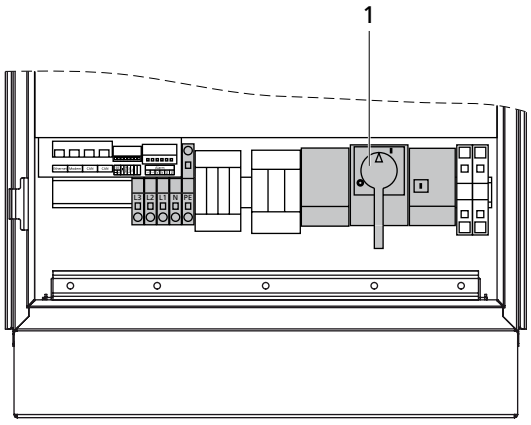
CAUTION

- Ensure proper mechanical and electrical installation before commissioning the Solar Inverter.
- Check the electrical lines to ensure that they are in sound condition.
- Always separate the solar generator side first by opening the DC load break switch and then the grid connection by switching off the corresponding mains fuse.

The Solar Inverter is supplied from the grid. The Solar Inverter switches on automatically when sufficient solar generator output is available. Corresponding switch-on and switch-off thresholds have been defined for this purpose.

Connecting

1. Establish the grid connection via the external circuit breaker.
2. Switch on the solar generator voltage by closing the DC load break switch (switching position 1). The Solar Inverter starts operating when sufficient input voltage is available.



1 Load break switch

The operating LED lights up in accordance with the operating state.

The commissioning menu opens when the Solar Inverter is connected for the first time.

Switching off

1. Disconnect the solar generator side by opening the DC load break switch (switching position 0).
2. Open the grid connection by switching off the circuit breaker.

4.2 Commissioning menu

The commissioning menu automatically opens the first time the Solar Inverter is connected. It guides you through the standard settings.

For a better understanding of keyboard operation, please also see the chapter Operation.

The commissioning of the Solar Inverter as

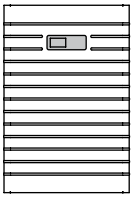
- single device and
- as a master and slaves with several networked devices

is described in detail below.

Commissioning a single device

System with one Solar Inverter

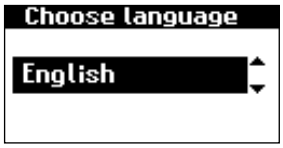
Single device



1. During initial start-up the following appears on the display:

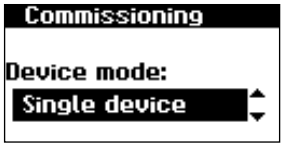
   Start commissioning with ok

2. Select required language with ▲ / ▼



   Confirm selected language with ok.

3. Select «Single device» with ▲ / ▼.



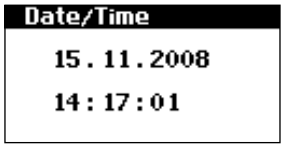
   Confirm with ok.

4. Set date and time.

Please proceed with caution for time settings, as they directly affect data logging. For example, if you set the time back by 1 hour, then the existing data for the last hour will be overwritten.

Select date with ok . Change selected number with ▲ / ▼ and jump to next number with ◀ / ▶.

Save the set date with ok then set the time accordingly.



Save the set time with ok

5. Set password. Select password ok
   Default password is:
   * * * * * * * *
   A new password can be set with ▲ / ▼ / ◀ / ▶ as an option.

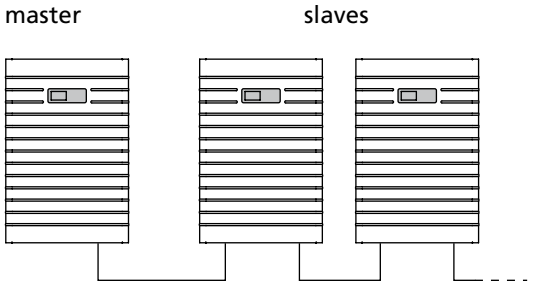
   Confirm password with ok.

6. Completion of commissioning

   Confirm overview with ok.

Commissioning several networked devices

System with several Solar Inverters



Before commissioning, all devices must be interconnected via the CAN bus interface. See section Networking Solar Inverters via CAN bus.

Switch on all devices following installation. Commissioning begins with the master you have selected.

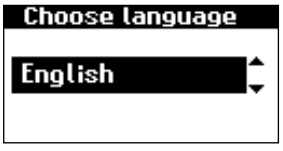
In mixed systems containing AT and PT Solar Inverters, the Solar Inverter PT is always the master.

Commissioning the master

1. During initial start-up the following appears on the display:

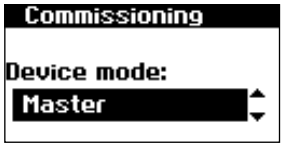
   Start commissioning with ok

2 Select required language with ▲ / ▼ .



   Confirm selected language with ok .

3. Select «Master» with ▲ / ▼ .



Confirm with ok .

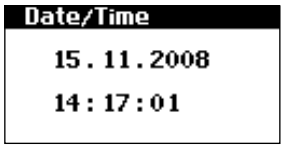
The other devices in the CAN network are automatically configured as slaves.

4. Set the data and time centrally for all connected devices.

Please proceed with caution for time settings, as they directly affect data logging. For example, if you set the time back by 1 hour, then the existing data for the last hour will be overwritten.

Select date with ok. Change selected number with ▲ / ▼ and jump to next number with ◀ / ▶.

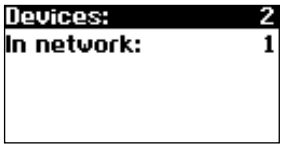
Save the set date with ok then set the time accordingly.



Save the set time with ok.

5. CAN network list is set up.

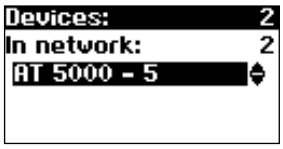
Depending on the size of the network, it may take a moment until the master has found all slaves and added them to the list.



Devices = total number of devices found in CAN network, including master

In network = number of configured devices, including master

After the master has found all connected slaves, these must be configured before commissioning of the master is continued. The device list is updated and extended whenever a slave is configured.



Confirm with ok.

6. Set password. Select password ok
Default password is:
* * * * * * * *
A new password can be set with ▲ / ▼ / ◀ / ▶ as an option.

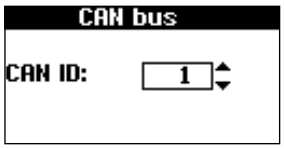
Confirm password with ok.

7. Completion of commissioning

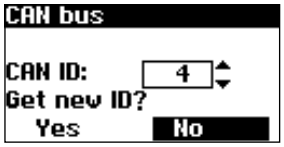
Confirm overview with ok.

Commissioning slaves
After a master has been defined, the display for requesting the CAN-ID is automatically shown on the display on each slave.

1. Request CAN ID. Request next highest free ID from master with ▲ or next lowest free ID with ▼. The master assigns a free ID to the slave. Confirm the ID with ok within 5 seconds.



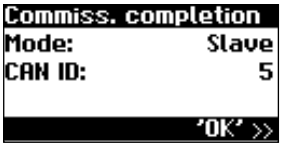
   Request further IDs ▲ / ▼.



   Confirm CAN ID with ok within 5 seconds.

- The data for the individual slaves can be assigned in the Sunways Browser and in the menu of the master based on the IDs.
- The CAN-ID 1 is automatically assigned to the master. This means the slaves can be assigned IDs between 2 - 99.
- Commissioning cannot continue until an ID has been requested from the master.
- The PT Solar Inverter also recognises devices from the AT series.

2. Completion of commissioning



   Confirm overview with ok.

3. Carry out commissioning for all other slaves as described above.

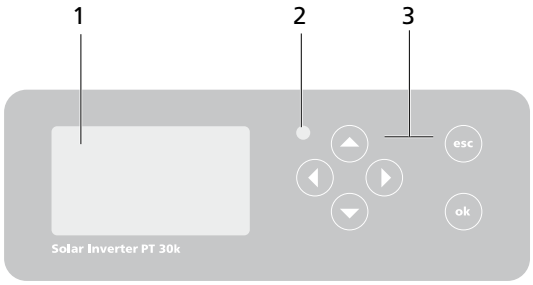
Later commissioning
If you add new devices or replace existing ones in your solar system, then you can display the device list in the display on the master under «Settings - Network - CAN bus». The new device can then be put into operation in accordance with the description for commissioning slaves.

5 Operation

5.1 Control elements

Operator panel

The Solar Inverter is controlled via the operator panel at the front.



1 LCD display (illuminated)
2 Operating LED
3 Keyboard

LCD display

A graphics-capable, monochrome dot matrix display is integrated in the operator panel. In standard mode the current output, daily yield and status are displayed. The bar graph shows the output curve for the current day. A bar represents a value averaged over 15 minutes.

Press any key to activate the display light. If no key is pressed with approx. 1 minute the display light goes out.

Important!

The LCD display is not a calibrated measuring device. A deviation of several percent is inherent in the system. Exact accounting of the data with the power supply company requires a calibrated meter.

Keyboard

The keyboard can be used to navigate in the menu, edit text fields, select entries from lists and enter numbers consecutively and digit by digit. User entries can only be made if the value to be changed is selected. The cursor changes visibly in the editing mode and indicates the digit to be changed.

-key	Scroll up.
- key	Scroll down.
- key	Select menu item..
- key	Back one menu level.
ok -key	Select menu item and confirm your entries.
esc -key	Cancel.

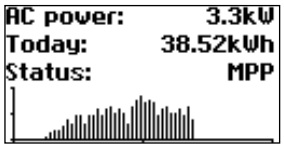
Operating LED

The combined red/green LED indicates the Solar Inverter status:

- LED off
  Solar Inverter is not active (night mode)
- LED green, continuously lit
  Solar Inverter is active and feeds into power grid (MPP mode)
- LED green, flashing
  Solar Inverter is active and feeds into power grid, although with current, output or temperature limitation.
- LED red, continuously lit
  A fault has occurred (malfunction)
- LED red, flashing
  Warning

Standard screen (single device)

The standard screen is always shown when no keyboard entry is made for more than 1 minute. It can also be called up manually with the menu item «Solar Inverter – Instantaneous Values».



The standard screen shows the main data at a glance. The first line shows the current feed-in power. The second line shows the energy fed in during the current day.

The status line indicates the device status with the following messages:

MPP	Feeding in MPP mode
AC cur.lim.	Feeding with AC current limitation
DC cur.lim.	Feeding with DC current limitation
Temp.lim.	Feeding with temperature limitation
Output lim.	Feeding with output limitation
Feed.	Feeding
Warning	A warning is active
Error	An error has occurred
Night	Night mode
Start	Device initialisation phase
COM-Upd	The communication software is being updated
DSP-Upd	The control software is being updated

The graphic in the lower section of the screen shows the output curve for the current day as a bar graph. The current period is shown as a flashing bar, as it is still increasing.

Standard screen (system)

This screen shows the system data for a CAN-networked system.

Next to the total current system output, you also see the energy yield of your solar system and any status messages of all connected devices. These are provided with the inverter number. «M» means that the error has occurred in the master.

- The various functions are accessed via the menu. The main menu is opened from the standard screen by pressing esc twice.
- You can always return to the standard screen by pressing and holding the esc key.
- If a status message is shown, then you can open the error list directly with ok.
- You can access other instantaneous values from the standard screen with ▼ and ▲.

5.2 Access rights

Operation of the Solar Inverter is divided into various areas protected with passwords.

The password has 8 digits or characters.
The password can be entered in the menu item «Settings – Login».

After a correct password entry the login remains active for 5 minutes. The device then switches back to guest mode. Pressing any key during the login period extends resets the period to > 5 minutes.

Customer area

The customer password must be entered to access this area. All settings can be made which are required for installation and commissioning of the Solar Inverter.

- The password for the customer area is:
  * * * * * * * *
- The password is preset and is directly confirmed with ok.
- As an option you can assign a personal password in the Commissioning menu. Digits between 0 – 9 and letters between a – z and A – Z are permitted.

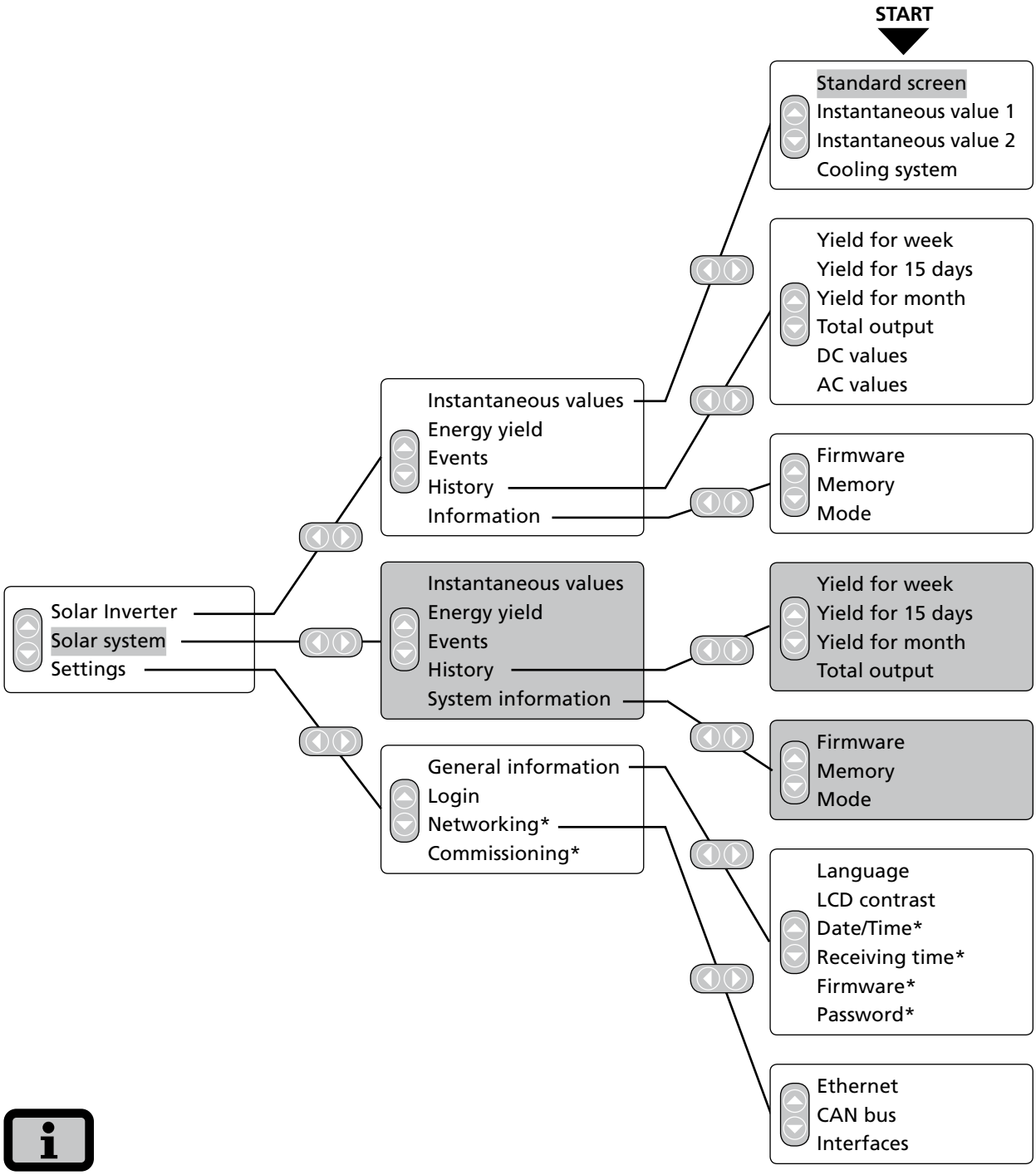
Installer area

In this area the installer can make special settings on the Solar Inverter which are available after consulting the Technical Hotline. Request a device-specific password from the Technical Hotline. These passwords are only relevant for the Sunways Browser. All commissioning procedures are accessible from the customer area.

Technical Hotline +49 (0)7531 996 77-577

5.3 Menu structure

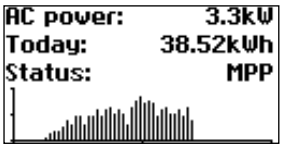
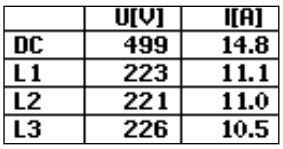
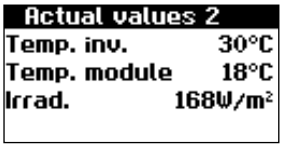
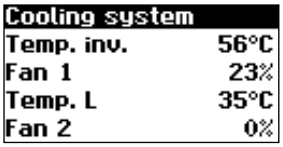
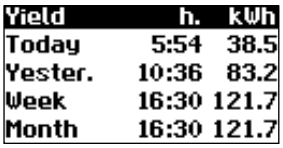
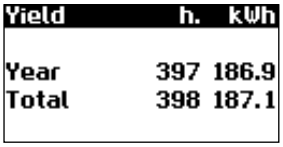
The menu provides access to all Solar Inverter screens. Open the main menu by pressing the left arrow key twice from the standard screen.

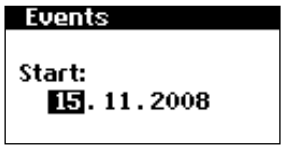
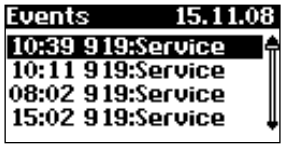
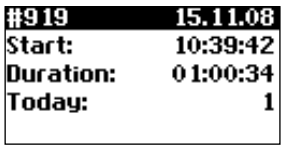
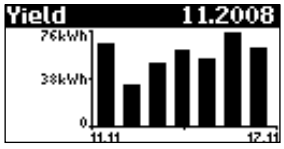
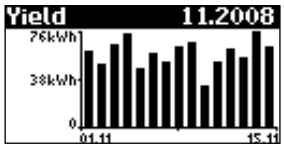
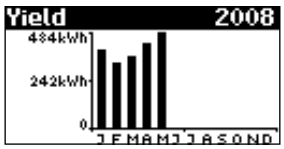
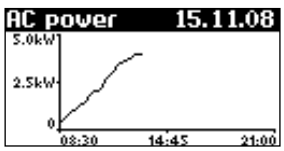


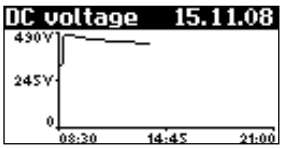
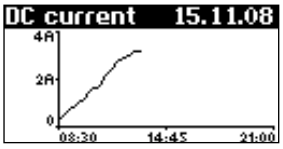
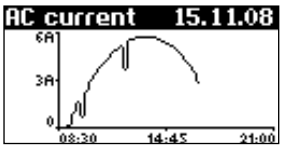
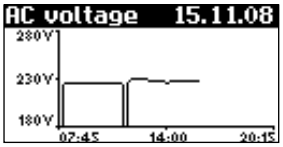
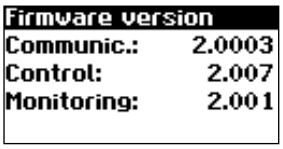
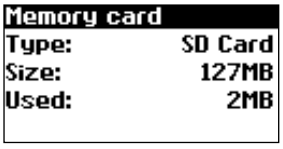
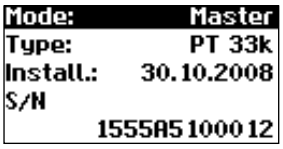
- The areas highlighted in grey are only available in the master

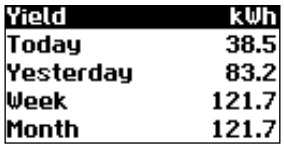
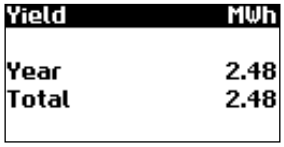
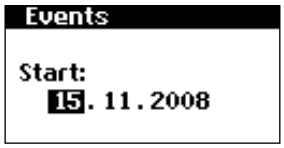
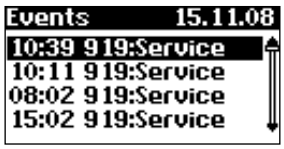
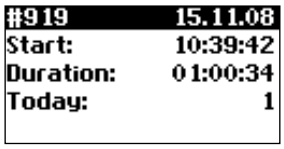
- *) after entry of customer password
  Standard password: ********

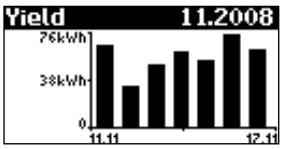
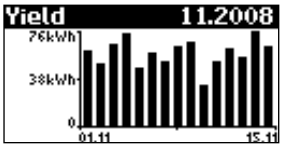
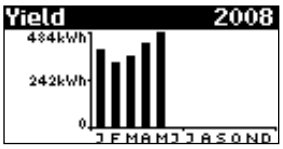
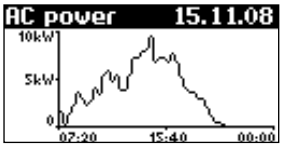
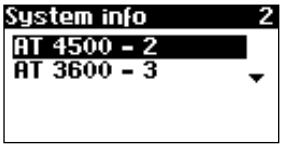
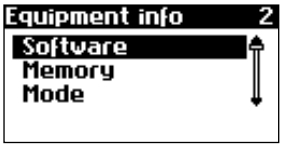
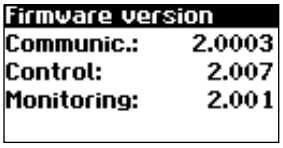
5.4 Overview of screen displays

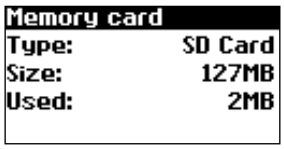
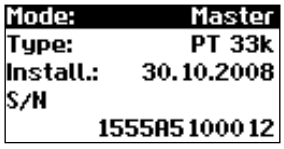
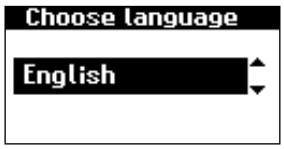
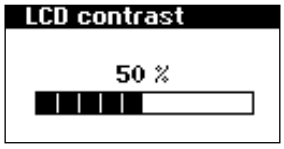
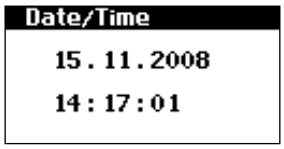
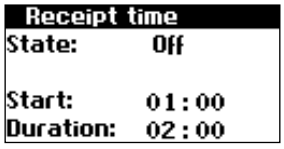
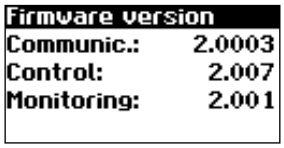
Display	Description	Menu selection
Instantaneous values – Device		
	Current feed-in power, daily energy yield and device status MPP: Feeding in MPP mode	The screen appears automatically it no key is pressed within 1 minute. Solar Inverter – instantaneous values
	Display of voltages and currents from solar generator and grid	Solar Inverter – Instantaneous values – ▼
	Module temperature and irradiance values (if sensor if connected)	Solar Inverter – Instantaneous values – ▼ – ▼
	Display of heat sink and choke temperature and load of the two fans	Solar Inverter – Instantaneous values – ▼ – ▼ – ▼
	AC yields and operating hours for today, yesterday, week and month	Solar Inverter – Energy yield
	AC yields and operating hours for current year and total value	Solar Inverter – Energy yield – ▼

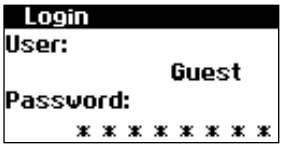
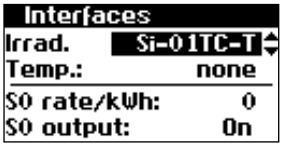
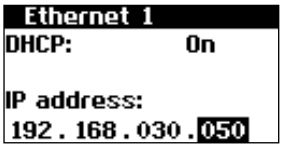
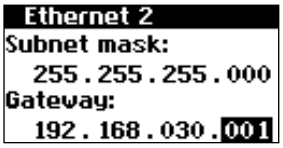
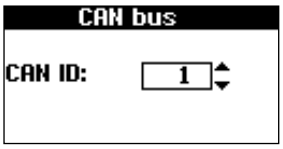
Display	Description	Menu selection
Events – Device		
	Select start data for event display	Solar Inverter – Events
	Display event list The event list shows the last 100 system messages from the start date. The heading always refers to the selected event. The CAN comm. message displayed here may be older than 15.11.2008.	Solar Inverter – Momentanwerte – ok
	Display event details (error number, data, starting time, duration and number of occurrences per day)	Solar Inverter – Events – ok – ok
History – Device		
	Daily yield for 1 week	Solar Inverter – History – Yield for week
	Daily yields for 15 days	Solar Inverter – History – Yield for 15 days
	Monthly yields	Solar Inverter – History – Yield for month
	AC output (5-min. values)	Solar Inverter – History – AC output

Display	Description	Menu selection
	DC voltage (5-min. values)	Solar Inverter – History – DC output
	DC current (5-min. values)	Solar Inverter – History – DC values – ▼
	AC current L1 (5-min. values) AC current L2 (5-min. values) AC current L3 (5-min. values)	Solar Inverter – History – AC values Switching between currents L1, L2 and L3 with ok
	AC voltage L1 (5-min. values) AC voltage L2 (5-min. values) AC voltage L3 (5-min. values)	Solar Inverter – History – AC values Switching between voltages L1, L2 and L3 with ok
Information – Device		
	Firmware	Solar Inverter – Information – Firmware
	Memory card	Solar Inverter – Information – Memory
	Device mode	Solar Inverter – Information – Mode

Display	Description	Menu selection
Instantaneous values – Solar system (display only available on master)		
	Current system feed-in power, daily energy yield and system status	The screen automatically appears on the master if no key is pressed for several minutes. Solar system – Instantaneous values
Yields – Solar system (display only available on master)		
	AC system yields and operating hours for today, yesterday, week and month	Solar system – Energy yield
	AC system yields and operating hours for year and total value	Solar system – Energy yield – ▼
Events – Solar system (display only available on master)		
	Select start data for system event display	Solar system – Events
	Display event list for entire system The event list shows the last 100 system messages from the start date. The heading always refers to the selected event. The CAN comm. message displayed here may be older than 15.11.2008.	Solar system – Events – ok
	Display event details (error number, data, starting time, duration and number of occurrences per day)	Solar system – Events – ok – ok

Display	Description	Menu selection
History – Solar system (display only available on master)		
	Solar system daily yield for 1 week	Solar system – System history – Yield for week
	Solar system daily yield for 15 days	Solar system – System history – Yield for 15 days
	Solar system monthly yields	Solar system – System history – Yield for month
	Solar system AC output (5-min. values)	Solar system – System history – AC output
System info – Solar system (display only available on master)		
	Device list for selecting a device	Solar system – System info
	Selection of information	Solar system – System info – ok
	Firmware	Solar system – System info – Firmware

Display	Description	Menu selection
	Memory card	Solar system – System info – Memory
	Device mode	Solar system – System info – Mode
Settings – General		
	Display language	Settings – General – Language
	LCD contrast	Settings – General – LCD contrast
	Set date/time (only possible with customer password)	Settings – General – Date/Time
	Set receiving time (starting time and duration in which the device can also be addressed in the night mode via the network). (only possible with customer password)	Settings – General – Receiving time
	Firmware (only possible with customer password)	Settings – General – Firmware
	Changing the customer password (only possible with customer password)	Settings – General – Password

Display	Description	Menu selection
Settings – Login		
	Password entry to access advanced settings (necessary for commissioning)	Settings – Login
Settings – Network (only possible with customer password)		
	Setting of the irradiation and temperature sensor and configuration of the S0 pulse output	Settings – Network – Interfaces
	Network settings (Screen 1): Activate DHCP for the automatic IP address setting or enter IP address manually	Settings – Network – Ethernet
	Network settings (Screen 2)	Settings – Network – Ethernet – ▼
	Have CAN bus ID for the slave assigned by the master	Settings – Network – CAN bus

5.5 Fault displays

The Solar Inverter indicates faults in the LCD display and saves them in the internal error memory.

The fault indication consists of a number and a short description. Based on the first number you can quickly recognise which area the fault has occurred in:

1: Solar generator fault
2: AC network fault
3: Inverter fault
4: Interface/communication fault
9: Service fault

If an error is shown in the standard display the full error message can be found in the menu under «Solar Inverter – Events.»

- A restart may be attempted in the event of an error message.
- Please note the serial number of the device and the error number before contacting the Technical Hotline.
- The Technical Hotline can be contacted on +49 (0)7531 996 77-577 during weekdays.

Display message	Description	Cause and possible remedies
Solar generator fault		
101:U-DCmax	Your PT 30k Solar Inverter is approved for a maximum solar generator open-circuit voltage of 1000 V. All DC input components are adequately dimensioned with a safety factor. If the threshold is exceeded, the Solar Inverter stops feeding.	The maximum DC voltage was exceeded. · Check the dimensioning of your PV generator. Too many modules are connected in series. · Reduce the number of modules and re-commission the system.
102:Insulation	Before each connection, your Solar Inverter checks the PV system for a possible earth fault or insulation faults. Should this kind of error be detected, no feeding takes place. The mode of operation is compliant with DIN VDE 0126-1-1.	The Solar Inverter has discovered an insulation fault in the PV system during run-up. · Check your PV system for possible insulation faults (damaged DC cables etc.). The measured insulation resistance must be at least 1000 kΩ.

Display message	Description	Cause and possible remedies
103:AFI>30mA **104:AFI>0.3A**	Your Solar Inverter is equipped with a AC/DC sensitive AFI according to DIN VDE 0126-1-1. The monitoring device has detected a sudden relative fault current increase of >30 mA or an absolute fault current of >300 mA.	A sudden fault current increase has occurred during Solar Inverter operation. · Check your PV system for possible insulation faults.
105:I-DC max.	Your PT 30k Solar Inverter is approved for a maximum DC current of 75 A. If the threshold is exceeded the Solar Inverter limits the DC current by moving the operating point.	The maximum solar generator current permitted for the inverter was reached. · Check whether the module interconnection generates an input voltage of less than 420 VDC at full load and rewire the modules according to the min. DC input voltage of 420 VDC.
AC network fault		
201:UAC1<Min **202:UAC2<Min** **203:UAC3<Min**	**AC undervoltage** Your Solar Inverter continuously monitors the voltage levels for feed phases L1, L2 and L3. If the voltage falls below the minimum permissible limit of -20% (184 V), the Solar Inverter stops feeding and does not start up again until the voltage value exceeds the minimum limit value.	· Ask your power supply company (PSC) about grid stability and design. · Ensure that the cross-sections of the feed lines are adequate, depending on country-specific standards and guidelines.
204:UAC1>Max **205:UAC2>Max** **206:UAC3>Max**	**AC overvoltage** Your Solar Inverter continuously monitors the voltage levels for feed phases L1, L2 and L3. If the voltage falls exceeds the maximum permissible limit of +15% (264.5 V), the Solar Inverter stops feeding and does not start up again until the voltage value falls below the maximum limit value.	· Ask your power supply company (PSC) about grid stability and design. · Ensure that the cross-sections of the feed lines are adequate, depending on country-specific standards and guidelines.
207:UAC1>10% **208:UAC2>10%** **209:UAC3>10%**	**AC overvoltage for 10 minutes** Your Solar Inverter continuously monitors the voltage levels for feed phases L1, L2 and L3. If the permitted limit value of +10% (253 V) is exceeded for 10 minutes on average, the Solar Inverter stops feeding and restarts after approx. 1 minute.	· Ask your power supply company (PSC) about grid stability and design. · Ensure that the cross-sections of the feed lines are adequate, depending on country-specific standards and guidelines.

Display message	Description	Cause and possible remedies
210:UAC1>10% **211:UAC2>10%** **212:UAC3>10%** **(Warnings)**	**AC overvoltage warning** This warning appears if a voltage of more than 253 V (+10%) is measured on a mains phase. The Solar Inverter switches if the limit is exceeded for more than 10 minutes.	· Ask your power supply company (PSC) about grid stability and design. · Ensure that the cross-sections of the feed lines are adequate, depending on country-specific standards and guidelines.
213:Frq1<Min **214:Frq2<Min** **215:Frq3<Min** **216:Frq1>Max** **217:Frq2>Max** **218:Frq3>Max**	**Grid frequency** Your Solar Inverter continuously monitors the grid frequency for feed phases L1, L2 and L3. If the value for a phase is outside the permitted range, the Solar Inverter stops feeding and does not start up again until the value is within the tolerance range. Restart time: approx. 45 s Tolerance range: 47.5 to 50.2 Hz	· Ask your power supply company (PSC) about grid stability and design.
219:IDC1>Max **220:IDC2>Max** **221:IDC3>Max**	**DC share in AC current** Your Solar Inverter continuously monitors the quality of current fed in. If a DC share of 1 A is found in the current fed in, the Solar Inverter stops feeding.	· Restart the Solar Inverter. If the error still occurs, please contact the Technical Hotline. The phone number is provided on the back of the manual.
222:Uexternal	External conductor voltage outside tolerance range. Invalid phase shift between L1, L2 and L3.	· Ask your power supply company (PSC) about grid stability and design. · Ensure that the cross-sections of the feed lines are adequate, depending on country-specific standards and guidelines.
223:Surgef.	Your Solar Inverter continuously monitors the quality of the AC grid. During high voltage peaks on the phase feeding in, the Solar Inverter stops feeding and attempts a restart.	The Solar Inverter has detected a high voltage peak on a phase feeding in. · After troubleshooting the Solar Inverter restarts automatically. · A monitoring phase and a neutral conductor were interchanged during connection of the AC side.

Display message	Description	Cause and possible remedies
Inverter fault		
301:HS temp **302:Choke temp** **303:PCB temp** **(Warnings)**	Your Solar Inverter is designed for an ambient temperature of up to +40 °C at full feed-in power. These warnings refer to violations of the temperature threshold for the heat sink (HS), choke or PCB. The feed-in power is reduced linearly in order to prevent further temperature increase.	The maximum permissible ambient temperature has been exceeded. · The installation location may be unsuitable. Please try and find an alternative installation location or improve the ventilation of the installation space. The air circulation requirement was not taken into account during installation. · Clean the Solar Inverter, if dirt prevents cooling. · Follow the installation notes in the manual.
304:Mains rel..	The PT 30k Solar Inverter checks the operation of the mains relay prior to every switch-on. An error was detected during this check.	· Restart the Solar Inverter. If the error still occurs, please contact the Technical Hotline. The phone number is provided on the back of the manual.
305:HS overtemp. **306:Choke overtemp.** **307:PCB overtemp.**	These error messages refer to violations of the temperature threshold for the heat sink (HS), choke or PCB. Feed is stopped. The Solar Inverter automatically switches back on again once the temperature at the corresponding measuring point has dropped again.	The maximum permissible ambient temperature has been exceeded. · The installation location may be unsuitable. Please try and find an alternative installation location or improve the ventilation of the installation space. The air circulation requirement was not taken into account during installation. · Clean the Solar Inverter, if dirt prevents cooling. · Follow the installation notes in the manual.

Display message	Description	Cause and possible remedies
Interface/communication fault		
401:SD Card	The Solar Inverter cannot find an SD card.	· Restart the Solar Inverter. If the error still occurs, please contact the Technical Hotline. The phone number is provided on the back of the manual.
402:SD Card	The SD card is write-protected.	· Restart the Solar Inverter. If the error still occurs, please contact the Technical Hotline. The phone number is provided on the back of the manual.
403:CAN user	Communication error with CAN user.	· Check whether an error has occurred in the secondary CAN device. Restart the slave and master if necessary.
404:CAN Bus	CAN bus not in operation.	No communication is possible via the CAN bus. · Check the bus cables and terminating resistor connectors. · Check whether the maximum line lengths are within the permitted limits. · Check whether bus cables were installed parallel to power cables. Separate bus lines and power cable from each other spatially if necessary.
405:CAN user	CAN user does not respond.	· Check whether an error has occurred in the secondary CAN device. Restart the slave and master if necessary.

Display message	Description	Cause and possible remedies
406:Solar **407:Temp** **(Warning)**	No sensor found on sensor channel 1 (solar) or 2 (temperature).	If a sensor is connected at Solar or Temp: · Check the connection to the sensor. If no sensor is connected: · Check the sensor input configuration via the LCD display or the Sunways Browser.
408:CAN comm. **(Warning)**	Communication malfunctions occur repeatedly on the CAN bus.	A malfunction occurs in the data transmission on the CAN bus. However, a data exchange continues to be possible. · Check whether all bus line connectors and terminating resistors are mounted properly. · Check whether bus cables were installed parallel to power cables. Separate bus lines and power cable from each other spatially if necessary.
409:CAN Cfg. **(Warning)**	The CAN bus is in configuration mode. No measured values are transferred.	At least one device is specified under «Settings – Network – CAN bus». · Close this menu in all devices.
410:SMTP Ser.	Warning: SMTP server cannot be reached (410).	Fault during e-mail delivery. Re-attempt e-mail delivery. · If the fault recurs check the e-mail settings via the Sunways Browser
411:SMTP Soc.	Warning: SMTP no socket available (411).	
412:SMTP Kom.	Warning: SMTP faulty communication with server (412).	

Display message	Description	Cause and possible remedies
413:DNS failed	Warning: DNS has failed (413).	Communication fault between the integrated web server and an Internet browser in conjunction with the Sunways Browser. These warnings are non-critical and can be ignored if they only occur occasionally. These warnings have no influence on the energy production of the inverter.
414:HTTP Con.	Warning: HTTP client connection has failed (414).	
415:HTTP Aut.	Warning: HTTP client authorisation has failed (415).	
416:HTTP Tim.	Warning: HTTP client timeout (416).	
417:HTTP Soc.	Warning: HTTP client no socket available (417).	
418:HTTP Soc.	Warning: HTTP client error with socket (418).	
419:HTTP Met.	Warning: HTTP client incorrect method (419).	
420:HTTP Pro.	Warning: HTTP client error with protocol (420).	
421:HTTP Wri.	Warning: HTTP client write error (421).	
422:HTTP Rea.	Warning: HTTP client read error (422).	
423:CAN Init	Warning: CAN initialisation error (423).	CAN bus initialisation fault during device startup. · Restart the Solar Inverter. If the error still occurs, please contact the Technical Hotline. The phone number is provided on the back of the manual.
424:NTP failed	Time synchronisation with the NTP server has failed.	Firewall port 123 is blocked. · Select alternative time server

Display message	Description	Cause and possible remedies
Service fault		
9xx: Service fault **9xx: Service warning**	A service fault has occurred.	· Disconnect the Solar Inverter from the grid and from the solar generator and reconnect it. If the error occurs again, please contact the Technical Hotline. The phone number is provided on the back of the manual.

6 System monitoring

6.1 General

The basis for the system monitoring is the data logger integrated in the PT Solar Inverter. The Solar Inverters of the PT series offer a wide range of monitoring options for your solar system:

- The Sunways Browser can display instantaneous values, stored operating data and settings.
- With active alerting the master can send errors which have occurred in the solar system to a selected recipient by e-mail.
- Via the Sunways Portal connection the PT Solar Inverter can send the operating data of your solar system to the Sunways Portal on a daily basis without additional hardware. This enables you to track your yields via the Internet.

One of the three possible connections between a PC and the Solar Inverter is required for this purpose:

- Direct connection via an Ethernet cable or internal network

The Solar Inverter is unable to send e-mails via a direct connection. Portal connection and active alerting is therefore not possible.

- Connection via the Internet, e.g. connection of the Solar Inverter to a DSL connection
- Connection via a Sunways Modem

6.2 Integrated data logger

The data logger integrated in the PT Solar Inverter stores the operating data of your solar system. In addition to 5-minute mean values, energy yields are also stored as 5-minute, daily, weekly, monthly and annual values. In addition up to 100 error/warning messages can be stored. Each data record contains the data and time. The data logger is designed as a circular buffer, i.e. the oldest data are overwritten with new data.

Operating data (5-min. mean values)

Number	Value
2000	DC current
2000	DC voltage
2000	AC current L1
2000	AC current L2
2000	AC current L3
2000	AC voltage L1
2000	AC voltage L2
2000	AC voltage L3
2000	AC output
2000	Device temperature
2000	Module irradiance (optional)
2000	Module temperature (optional)

Energy yields

Number	Value
2000	5-minute yield
800	Daily yield
800	Weekly yield
250	Monthly yield
20	Annual yield

Status messages

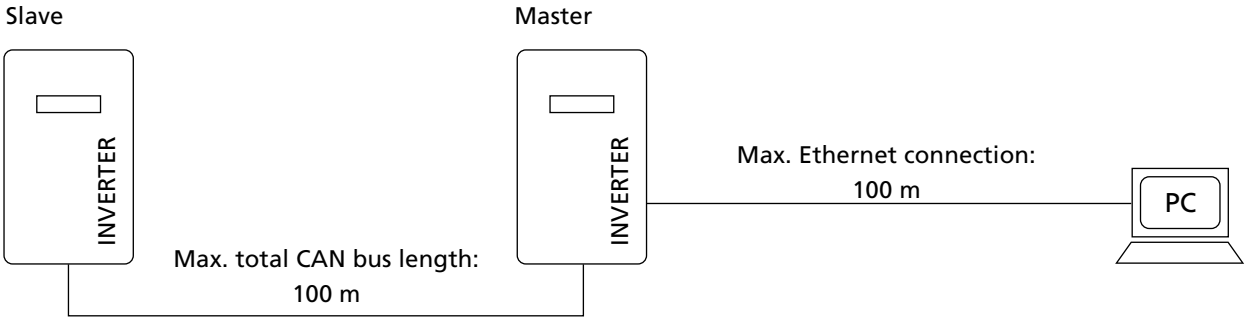
Number	Value
200	Status changes

6.3 Direct Ethernet connection

The Solar Inverters are equipped with an Ethernet interface as standard for system monitoring and configuration with a PC.

Connect your PC and the Solar Inverter with a crossed or 1:1 Ethernet connection cable of the type CAT5 with RJ45 sockets (automatic detection) or with the Ethernet cable provided.

The PC is connected to the master as standard.



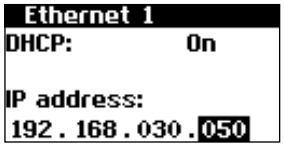
- To always find the suitable configuration for installation and commissioning on the PC, we recommend the use of a second network card (e.g. PCBus, PCMCIA), which you can configure to match the default setting of the Solar Inverter.
- The PC and the Solar Inverter must have suitable IP addresses and net masks. The network settings can be adjusted either directly on the Solar Inverter via the LCD display or on your PC.
- If two network cards are used the IP addresses must be in separate subnets, e.g. 192.168.30.XXX and 192.168.40.XXX.

6.4 Network settings on Solar Inverter

- The Solar Inverter is supplied with the following, preset IP address: **192.168.30.50**
- In the default setting the Solar Inverter does not support a DHCP (Dynamic Host Configuration Protocol). Therefore, the IP address is not assigned automatically. It is possible to activate the DHCP protocol via the Settings menu.
- IP addresses may only be assigned once within the network.

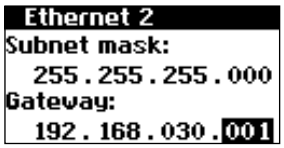
If required you can assign your own IP address for the Solar Inverter via the Settings menu.

1. Open the menu «Settings – Login».
2. Enter the default password (********) or your chosen password.
3. Open the menu «Settings – Network – Ethernet».
4. Enter an IP address suitable for use with your PC. This means the first three number blocks must be identical, and the last number block different.



Example:
If your PC has the IP address 192.168.1.1, enter 192.168.1.2 for your Solar Inverter

5. Use ▽ to access further settings.



6. Enter the subnet mask 255.255.255.0.
7. Enter the IP address of your PC in the gateway.
8. Confirm with ok.

After the network configuration is completed you can start the Sunways Browser by entering the IP address of the Solar Inverter in the address line of your web browser.

6.5 Network settings on the PC

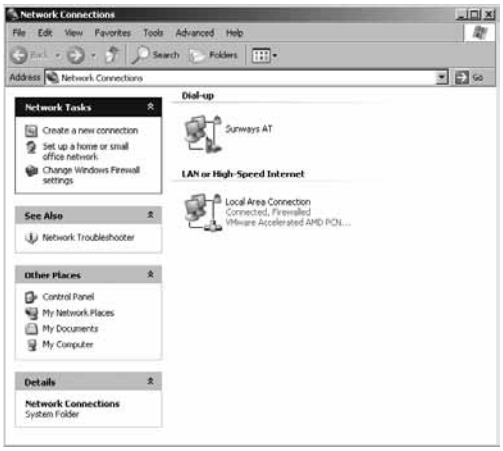
To enable your PC to communicate with the Solar Inverter certain network settings are required. The procedure differs slightly depending on the operating system. A configuration example for Windows® XP is shown below.

IP addresses may only be assigned once within the network.

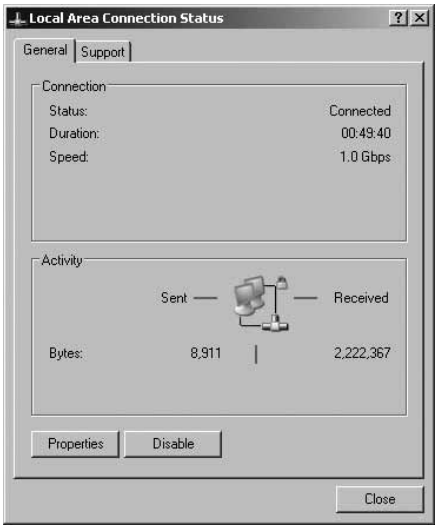
1. Select «Start – Settings».

2. Select «Network Connections».

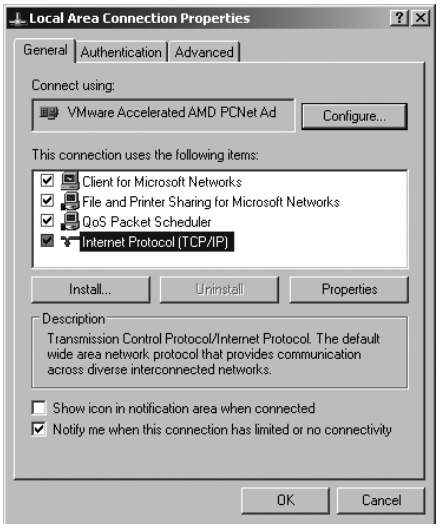
3. Double-click on the LAN connection through which you are connected to the Solar Inverter.



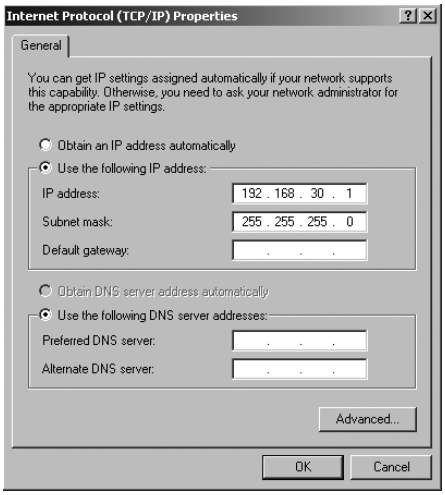
4. Click «Properties» in the Status window.



5. Select «Internet Protocol (TCP/IP)» and click «Properties» again.

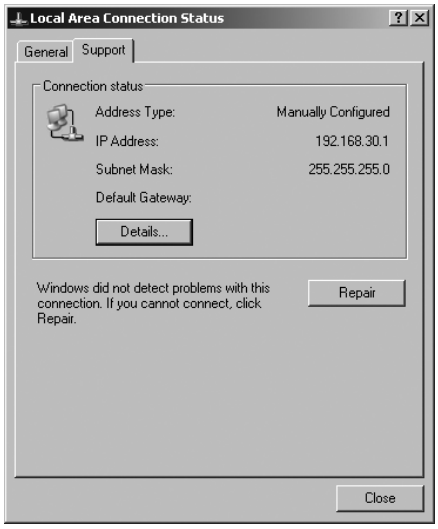

Local Area Connection Properties
General Authentication Advanced
Connect using:
VMware Accelerated AMD PCNet Ad
Configure...
This connection uses the following items:
Client for Microsoft Networks
File and Printer Sharing for Microsoft Networks
QoS Packet Scheduler
Internet Protocol (TCP/IP)
Install...
Uninstall
Properties
Description
Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.
Show icon in notification area when connected
Notify me when this connection has limited or no connectivity
OK
Cancel

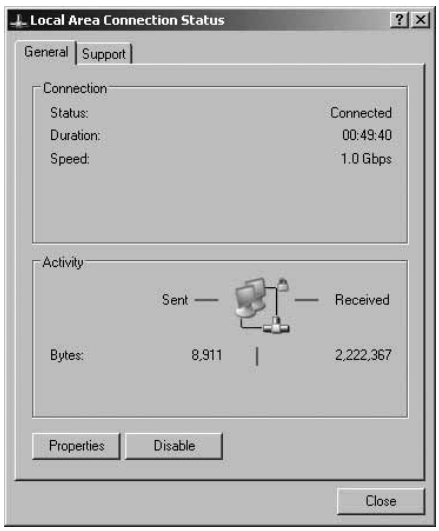
6. Now assign an unused IP address **192.168.30.XXX** and enter the subnet mask **255.255.255.0**.


Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 30 . 1
Subnet mask: 255 . 255 . 255 . 0
Default gateway:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

7. Click OK to confirm your entries.

8. In the «Status» menu item you can check the correctness of your entries and the status of your connection





After the network configuration is completed you can start the Sunways Browser by entering the IP address of the Solar Inverter in the address line of your web browser.

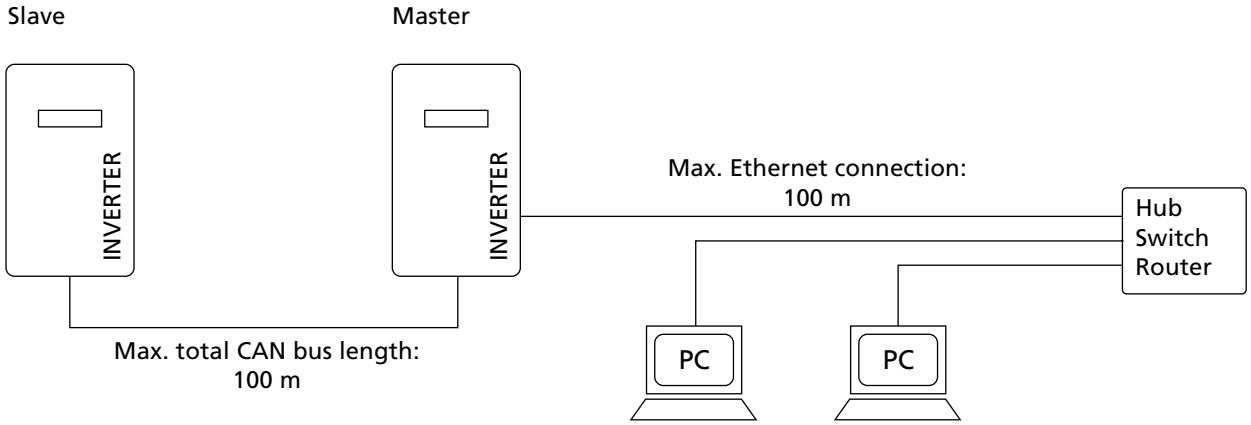
For more complex network configurations please contact your network administrator.

6.6 Connection via an existing Ethernet network

If an existing home or company network is available you can integrate the PT Solar Inverter directly in the network as a network device.

Connect your PC and the Solar Inverter with a CAT5 Ethernet cable with 1:1 RJ45 sockets.

The master is connected to the network as standard.



With DHCP
If a DHCP server is present in your network, you can activate DHCP on the Solar Inverter. In this case the Solar Inverter obtains the network settings automatically. You can display the assigned IP address via the LCD display (menu «Settings – Network – Ethernet»)

Without DHCP
If there is no DHCP server in your network, you must set an unused IP address on the AT Solar Inverter (see section Solar Inverter network setting settings).

Ask your network administrator for suitable settings for IP address, net mask and gateway.

After the network configuration is completed you can start the Sunways Browser by entering the IP address of the Solar Inverter in the address line of your web browser.

6.7 Access via DSL router

If a DSL connection or a network with Internet access is available you can make the Solar Inverter accessible via the Internet.

Requirement:
Your DSL modem or Internet router supports static IP address services, e.g. www.dyndns.org
Your router supports port forwarding.

1. Connect your Solar Inverter with your DSL router. Use a CAT5 Ethernet cable with 1:1 RJ45 sockets. The master is connected to the network as standard.

2. Register free of charge at www.dyndns.org, for example

3. Create an alias for accessing your Solar Inverter, e.g. pt-sunways.dyndns.org. You can then access your Solar Inverter via this address.

4. Configure your DSL modem or Internet router such that the IP address is regularly reported to www.dyndns.org (follow the procedure described in the manual for your DSL modem or Internet router for this purpose).

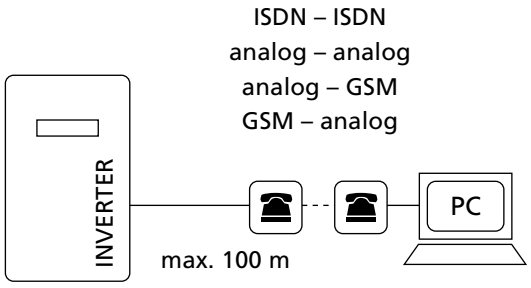
5. Configure your DSL modem or Internet router such that it accepts requests from the Internet via Port 80, for example, and forwards them internally to the Solar Inverter (port forwarding).

6. Also note that the port for access from the Internet set in your firewall must be enabled.

Instructions for configuring common DSL routers are available for download from the Sunways AG website.

6.8 Connection via the Sunways Modem

A modem connection can be used to bridge longer distances during system monitoring and configuration. Connect the Sunways Modem with the Solar Inverter. The Sunways Modem is available as an analog, ISDN and GSM type.



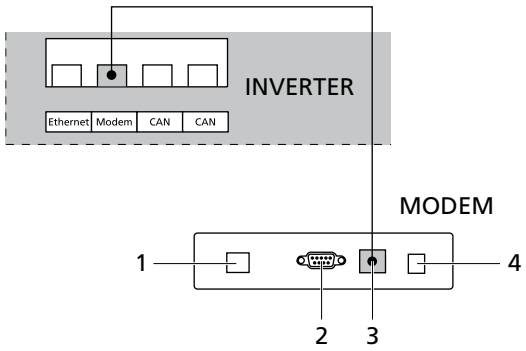
1. Connect your the Solar Inverter and your PC with a crossed or 1:1 Ethernet connection cable, type CAT5 with RJ45 sockets.

In a networked system only the master should be connected to the remote modem as standard.

2. Connect an external modem to your PC or, if available, use the internal modem of the PC. For commissioning please refer to the Sunways Modem user manual.

The following modem combinations are permitted:
ISDN – ISDN
analog – analog
analog – GSM
GSM – analog

Connecting a Sunways Modem



1 Telephone connection
2 RS232 interface
3 LVDS for AT and PT Solar Inverters
4 Power supply device

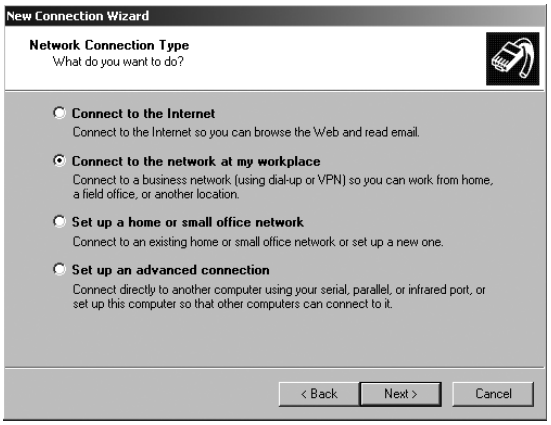
6.9 Dial-up connection from a PC to the Solar Inverter

To establish a connection between your Solar Inverter and a PC via the modem you have to establish a dial-up connection in Windows. The procedure under Windows® XP is described below.

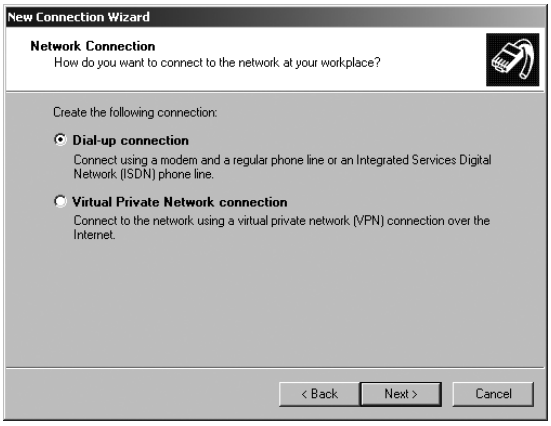
1. Run the wizard for a new connection via Start – Settings – Network Connections.

   Click «Next» to open the first selection screen.

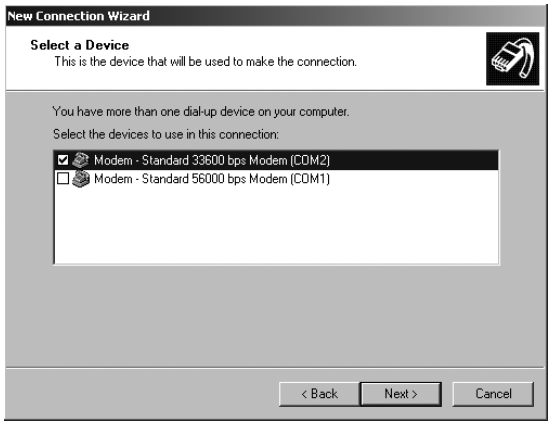
2. Select «Connect to the network at my workplace».


New Connection Wizard
Network Connection Type
What do you want to do?
Connect to the Internet
Connect to the Internet so you can browse the Web and read email.
Connect to the network at my workplace
Connect to a business network (using dial-up or VPN) so you can work from home, a field office, or another location.
Set up a home or small office network
Connect to an existing home or small office network or set up a new one.
Set up an advanced connection
Connect directly to another computer using your serial, parallel, or infrared port, or set up this computer so that other computers can connect to it.
< Back
Next >
Cancel

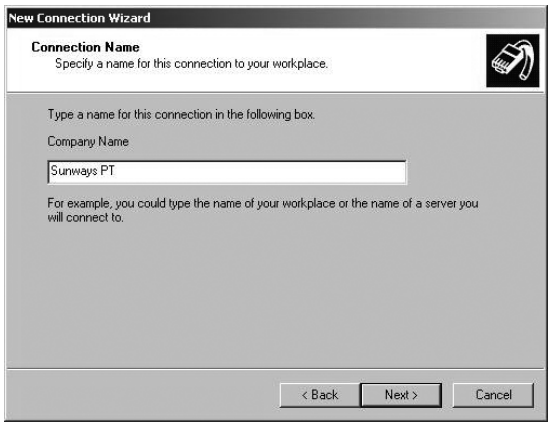
3. Click «Next», select «Dial-up connection» in the next screen, and click «Next».


New Connection Wizard
Network Connection
How do you want to connect to the network at your workplace?
Create the following connection:
Dial-up connection
Connect using a modem and a regular phone line or an Integrated Services Digital Network (ISDN) phone line.
Virtual Private Network connection
Connect to the network using a virtual private network (VPN) connection over the Internet.
< Back
Next >
Cancel

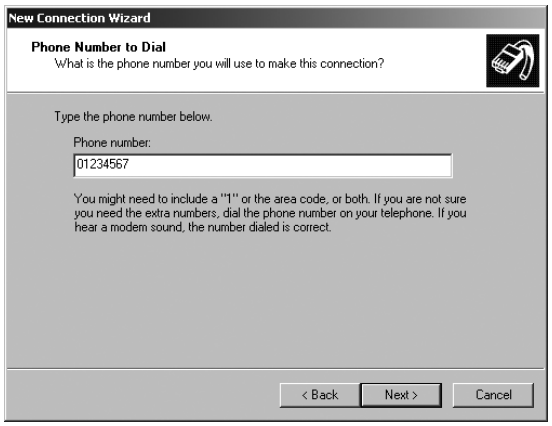
4. A list of installed modems appears. Select the required modem and click «Next».


New Connection Wizard
Select a Device
This is the device that will be used to make the connection.
You have more than one dial-up device on your computer.
Select the devices to use in this connection:
Modem - Standard 33600 bps Modem (COM2)
Modem - Standard 56000 bps Modem (COM1)
< Back
Next >
Cancel

5. Enter a connection name and click «Next».


New Connection Wizard
Connection Name
Specify a name for this connection to your workplace.
Type a name for this connection in the following box.
Company Name
Sunways PT
For example, you could type the name of your workplace or the name of a server you will connect to.
< Back
Next >
Cancel

6. Specify the phone number for your Sunways Solar Inverter.


New Connection Wizard
Phone Number to Dial
What is the phone number you will use to make this connection?
Type the phone number below.
Phone number:
01234567
You might need to include a "1" or the area code, or both. If you are not sure you need the extra numbers, dial the phone number on your telephone. If you hear a modem sound, the number dialed is correct.
< Back
Next >
Cancel

When entering the telephone number, you may have to include one or more digits to connect to an outside line. (An outside line is usually obtained by placing a «0» before the actual telephone number).

Click «Next».

7. Click the checkbox to place a shortcut on your desktop and click «Finish».

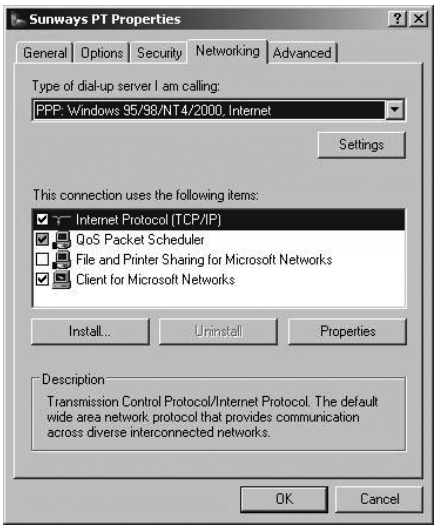
New Connection Wizard
Completing the New Connection Wizard
You have successfully completed the steps needed to create the following connection:
Sunways PT
• Share with all users of this computer
The connection will be saved in the Network Connections folder.
Add a shortcut to this connection to my desktop
To create the connection and close this wizard, click Finish.
< Back
Finish
Cancel

8. The connection window appears automatically once the connection has been established. (Alternatively via the icon on your desktop or via Start – Settings – Network Connections).

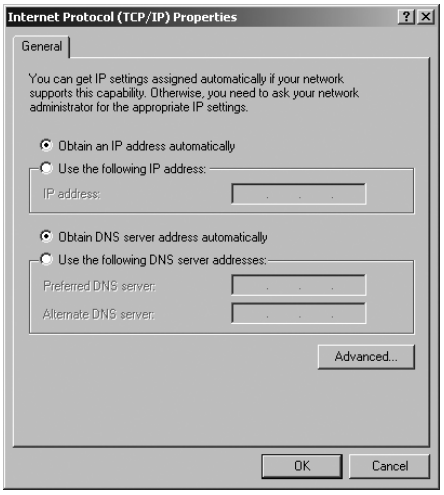
Further settings are required in the «Properties» section.

9. First click the «Networking» tab and select «Internet Protocol (TCP/IP)».

   Select «Properties».

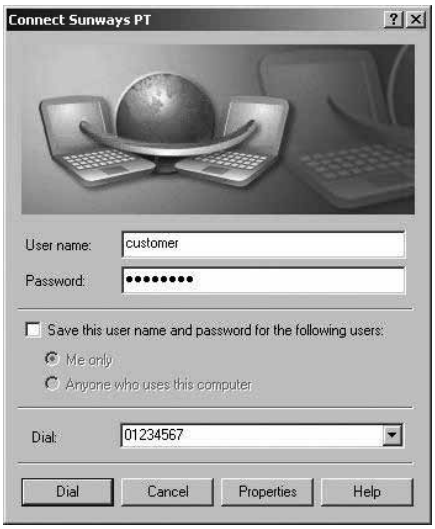


10. Enter the following data:
    Obtain an IP address automatically
    Obtain DNS server address automatically


Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address:
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server:
Alternate DNS server:
Advanced...
OK
Cancel

11. Enter «customer» as the user name and the standard password (********) or the password you entered previously.

The password matches the customer password on the device.



12. Click «Dial» to establish the connection. After the connection is established you can start the Sunways Browser by entering the IP address of the Solar Inverter in the address line of your web browser.

In contrast to the normal IP address for a modem connection the IP address of the Solar Inverter is set to **192.168.20.50** by default.

6.10 Sunways Browser

General information

The Sunways Browser can be called up via a standard Internet browser, e.g. Mozilla Firefox. One of the four possible connections between a PC and the Solar Inverter is required for this purpose:

- Direct connection via an Ethernet cable
- Connection via an existing internal Ethernet network
- Internet connection, e.g. connection of the Solar Inverter via DSL
- Connection via a Sunways Modem

sunways
Welcome to the Sunways browser
These web pages are provided by your Sunways Solar Inverter. Via the Sunways browser you can directly access your solar inverter with a web browser.
These functions are available to you depending on your access rights:
• Overview page for your entire solar system
• Instantaneous values and status of individual devices or the entire system
• Display of status messages
• Display of the stored operating and yield data
• Setting up your solar inverter
• Display device information
• Software update

After entering the IP address for the Solar Inverter in the address line of the browser the following functions are available:

- Display of the operating mode and instantaneous values for a single device or for a CAN-networked system
- Display of energy yields as 5-minute, daily, monthly, annual and total values
- 5-minute mean values of solar generator current and voltage, grid current and voltage and feed-in power
- Settings, e.g. for date/time, interface configuration, alerting options, communication parameters etc.
- Communication software update (LCD display, interfaces,communication and Sunways Browser) and the control software (control and monitoring)

Access protection

The Sunways Browser is provided with password protection so that unauthorised persons cannot access your Solar Inverter.

The following user data are set in the delivered state:

User: **customer**
Password: * * * * * * *

- It is recommended that you change this password to an 8-digit/character password.
- This password is identical to the password entered via the LCD display for settings and commissioning.
- If you cannot remember the password you can request a device-specific password from the Technical Hotline so that you can access your Solar Inverter again. In this case you should be able to present proof of purchase of the Solar Inverter.

Overview – Menu

Home – Displays the start page

Solar Inverter – Displays the instantaneous values, stored operating data, Solar Inverter status

Solar System – Displays a system overview with status, total output, yields and access to slaves (only available if the device is connected with the master).

Information – Device information, e.g. serial number

Settings and software update for the device or the networked system

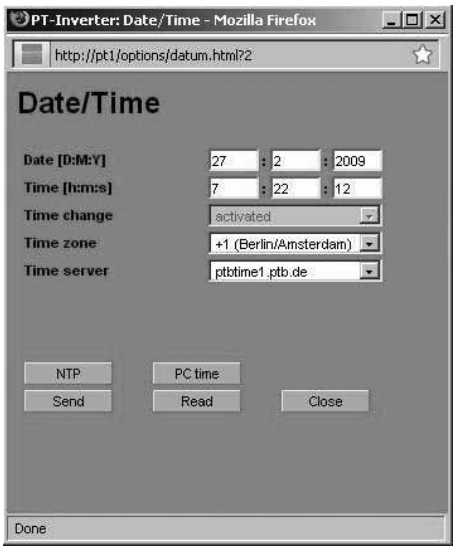
Language selection

The web pages are available in German, English, French, Spanish and Italian. Click on the respective country flag to select the language.

Setting the date/time

This function can be accessed via Settings – Date/Time. If you have selected the correct time zone and an Internet connection is available, you can automatically synchronise the time of the Solar Inverter with a time server with the NTP button.

Alternatively you can transfer the PC time to the Solar Inverter.



Please proceed with caution for time settings, as they directly affect data logging. For example, if you set the time back by 1 hour, then the existing data for the last hour will be overwritten.

Software update

The software update is used to extend the functionality of your Solar Inverter. The communication software (responsible for LCD display, interfaces, communication and Sunways Browser) and the control software or the monitoring software can be updated.

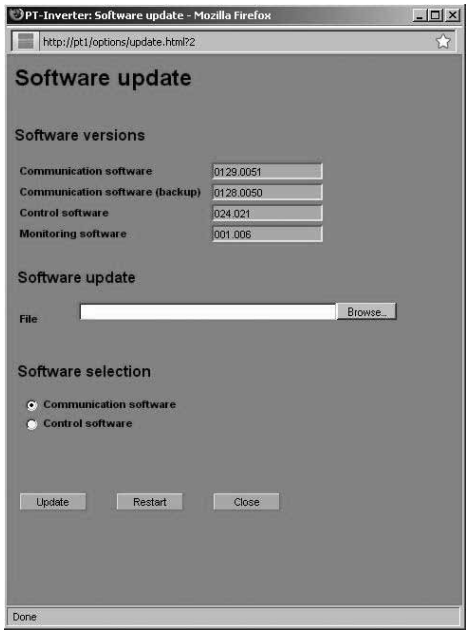
1. Select «Settings – Software Update». This function requires entry of a password (default: ******** or the password you entered previously).

2. The upper screen section shows the current software versions. If a new version is available on our website (www.sunways.de), you can download the file and load it via the Sunways Browser. Select the file on your hard disk via the «Browse...» button and confirm with OK.

3. Then select the software you want to update (communication software, control software or monitoring software)

4. Click Update to copy the software update to the Solar Inverter.

5. Click Reboot to reboot the device and load the new software.

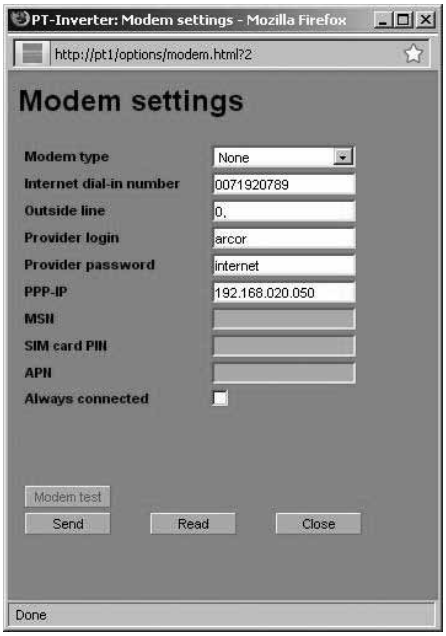


Alternatively the system update may be distributed to the slaves via the software master. Please contact our Technical Hotline for further information. The phone number is provided on the back of the manual.

6.11 Internet dial-up via modem

Modem settings

If you use a modem to connect to the Internet, the modem must be set up via the Sunways Browser. First establish a connection between your PC and the Solar Inverter (see section Direct Ethernet connection). Enter the following settings via «Settings – Modem» in your web browser:



Modem type
Select the modem type:
analog, ISDN or GSM

Internet dial-in number
Dial-in number for your Internet provider (ISP)

Outside line
If you have a telephone system, you may have to enter 0, for example. A comma results in a dialling pause of 1 second

Provider login
User name defined by your Internet provider

Provider password
Password defined by your Internet provider

PPP-IP
You can reach the Solar Inverter by entering this IP address in your web browser. The address is set to 192.168.20.50 by default.

MSN
MSN for the modem extension (ISDN modem). This is usually the extension number of without the area code.

SIM card PIN
SIM card PIN for GSM modem.

Function buttons
Click «Send» to save the settings in the Solar Inverter.

Click «Read» to display the current Solar Inverter settings.

Click «Modem Test» to test the connection between the modem and the ISP. You receive a reply as to whether dialling in was successful.

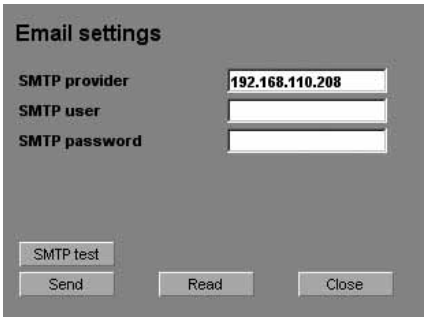
- Before conducting the modem test, the settings must be stored in the Solar Inverter by clicking «Send».

- Cheap ISP dial-up numbers are available from www.teltarif.de/internet or www.billiger-surfen.de, for example. Here you will find not only tariff information, but also the access data (phone number, user name, password).

E-mail settings

To enable the Solar Inverter to send E-mails, the E-mail settings must be stored via the Sunways Browser. The settings can be accessed via «Settings – Network» in the «Email Settings» section.

Requirements:
- When dialling in via modem, the correct dial-up settings must be stored (see Internet dial-up via modem).



SMTP provider
SMTP server for sending e-mails, e.g. mail.gmx.net (max. 30 characters). Alternatively an IP address can be entered.

SMTP user
User name for your e-mail provider (generally your e-mail address), e.g. sunways@gmx.de (max. 50 characters)

SMTP password
Password for your e-mail provider

Function buttons
Via «SMTP Test» you can send a test e-mail to the e-mail address stored for active alerting.

- Before conducting the SMTP test, the settings must be stored in the Solar Inverter with «Send».

- During the SMTP test an e-mail is sent to the e-mail address stored in the monitoring system (active alerting). Before starting the test check whether a valid e-mail address is stored under active alerting.

- If the configured SMTP server does not use a login, the user and password fields must be left blank.

Click «Send» to save the settings in the Solar Inverter.

Click «Read» to display the current Solar Inverter settings.

6.12 Active alerting

General information

With active alerting you can receive status messages (errors and warnings) for your solar system by e-mail. If a status message was active for longer than 15 minutes or occurred 5 times in one day, you will receive an e-mail at the next full hour under the e-mail address stored in the Solar Inverter.

The master sends the status messages of all Solar Inverters if they are CAN-networked.

Requirements:

- The master must be connected to the Internet via a network or modem.
- When dialling in via modem, the correct dial-up settings must be stored (see Internet dial-up via modem).
- Correct e-mail settings must be stored in the Sunways Browser (see «Email settings»).

Alerting settings

The alerting settings can be accessed with the button «Settings – System Monitoring» in the «Active Alerting» section».

Active Email alerting
Activation or deactivation of the active alerting function.

Email address
In the «Email address» field enter the e-mail address to which messages should be sent.

Function buttons
Click «Send» to save the settings in the Solar Inverter.

Click «Read» to display the current Solar Inverter settings.

6.13 Sunways Portal connection

General information

The operating data of your solar system can be transferred to the Sunways Portal for remote monitoring via the Internet. This is possible without using a Sunways Communicator.

The portal connection is configured via the Sunways Browser. Following activation the master automatically sends a registration e-mail containing the system data (e.g. number of devices, serial number, etc.) to the Sunways Portal.

After activation the operating data are e-mailed to the Sunways Portal on a daily basis before the master is switched off for the night. Alternatively a shorter interval can be selected. If a change is made to your solar system (e.g. additional device), then the change is automatically reported to the Sunways Portal.

A basis access for the Sunways Portal for displaying the yield data is available to every Sunways customer free of charge. Expanded functions, e.g. the setpoint-actual comparison in the Sunways Portal, can also be purchased for a fee.

The master sends the status messages of all Solar Inverters if they are CAN-networked.

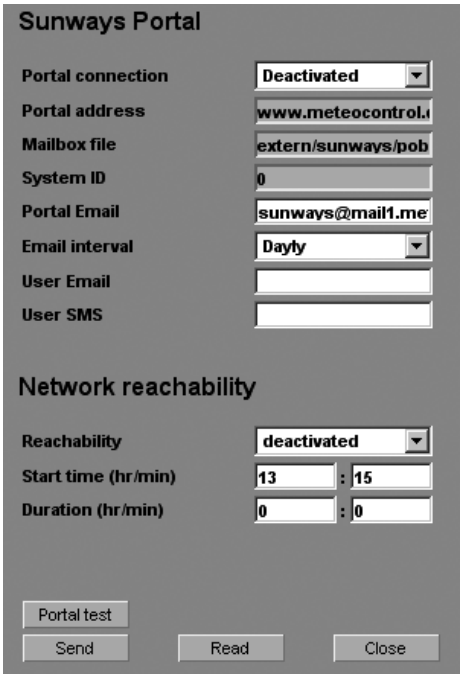
Requirements:

- The master must be connected to the Internet via a network or modem.
- Correct Email settings must be stored in the Sunways Browser (see «Email settings»)
- Correct portal settings must be stored in the Sunways Browser.

Setup

Check whether all requirements are met. Configure the specified settings if necessary.

Open the settings page in the Sunways Browser. This can be accessed under «Settings – System Monitoring» in the «Sunways Portal» section.



Portal connection
Activation or deactivation of the portal connection.

Portal address
Preset for the Sunways Portal

Mailbox file
Preset for the Sunways Portal

System ID
System ID assigned by the portal. This is generated automatically after portal activation and sent to the Solar Inverter. It can take up to 4 minutes before the Solar Inverter displays the system ID.

Portal Email
Preset for the Sunways Portal. Alternatively you can enter a different address if you wish to analyse the operating data yourself.

Email interval
Select the e-mail interval. If you operate the system on a DSL modem, you can set a short interval. If you use a modem connection, select a longer interval (e.g. daily) to avoid excessive telephone charges.

User Email
Enter an e-mail address for the confirmation e-mail sent by the portal. It contains a link for activating your system in the Sunways Portal.

User SMS
As an option you can specify an SMS number to which an SMS message is sent after your system is successfully set up in the portal.

Function buttons
With «Portal Test» you can test the portal connection. You receive an e-mail at the address specified under «User e-mail» and an SMS if you have entered your mobile phone number under «User SMS».

Before the portal test you must transmit the settings to your Solar Inverter via «Send». If the test was successful, a message is sent to the user e-mail address or the user SMS address.

Click «Send» to save the settings in the Solar Inverter.

To view your system data in the Sunways Portal, you require a user account. This will be issued to you if you follow the link in the confirmation e-mail and fill out the registration form.

Alternatively you can enter an existing user name with the correct password to assign the system to an existing user account.

7 Maintenance

7.1 Servicing schedule

Regular maintenance is required in order to ensure sound operation of the Solar Inverter. Maintenance must be carried out according to the commissioning and maintenance protocol from Sunways AG.

DANGER

- Maintenance may only be carried out by qualified staff. Dangerous voltages!
- Touching live parts can result in death.
- All electrical work must be carried out by a qualified electrician while observing the VDE regulations, national and other regulations.
- The checks must be carried out based on the recognised state of the art and the regulations specified by employers' liability insurance associations.
- The specified sequence of tasks and checks must be followed.

7.2 Servicing interval

The PT 30k Solar Inverter must be serviced annually.

The first service should be carried out no later than 12 months after commissioning.

The following maintenance tasks should be carried out once per calendar year.

The service must be carried out no later than 2 months after the month in which the device was commissioned. At installation locations where the equipment is subject to soiling, the filter mats may have to be replaced more frequently.

The service can be undertaken by Sunways AG or a service partner as part of a service agreement.

7.3 Maintenance tasks

Wiring
Visual inspection and measurement of all AC and DC cables between the module and the public grid of the energy supplier (terminals and transitions).

Solar generator connection box

Extreme danger from electric shock!

The main DC switch in the inverter must be in the «0» position.

Measurement configuration at the inverter output of the module connection box, close the DC fuse holder for the string to be measured, record the result, fold out the fuse holder and measure other strings in the same way, if required.

1. Check the open circuit voltage for each string.
2. Check the short circuit current for each string.
3. Measure the DC voltage
4. Measure the mains voltage
5. Connection test
6. Check the MPP status
7. Check the MPP voltage

Inverter

1. Clean the filters. If the filters are too dirty replace them.

   In each case two filter mats at the top (only for IP 54 versions) and two filter mats in the base of the Solar Inverter should be replaced. To replace the filter mats in the base release the bolts at the side and fold the module downwards.

2. Check the connectors. Done and OK?
3. Connection bolts checked and OK?
4. Visual inspection of the interior for assessing the electrical components.
5. Check overvoltage protection
6. Software updates if new software is available
7. Grid connection: Visual inspection of the transformer housing and the electricity meter.
8. Manual current and voltage measurements with multimeter and current probe for all strings.
9. Insulation measurements for the individual strings.

8 Appendix

8.1 Technical data

Article no.	**SI330P11A**	**IP42 protection class**
	SI330P21A	**IP42 protection class, with DC overvoltage protection**
	SI330P31A	**IP54 protection class**
	SI330P41A	**IP54 protection class, with DC overvoltage protection**

DC Input	
Rated DC power	31000 W
Maximum DC current	75,0 A
Nominal DC voltage	700 V
MPP voltage range	420 V...800 V
Maximum voltage DC	1000 V
Number of inputs per MPP tracker	1 x Wago rail-mounted terminal blocks 35 mm²
Number of MPP trackers	1

AC output	
Rated AC output power	30000 W
Maximum AC power	30000 W
Nominal AC current	43,5 A per phase
Maximum AC current	ca. 45,0 A per phase
Current capacity at the feed-in point	at least 100 A per phase
Nominal frequency	50 Hz
Frequency tolerance range	47,5 Hz...50,2 Hz (according to DIN VDE 0126-1-1)
Grid voltage	400 V
AC voltage range	-20%...+15% (according to DIN VDE 0126-1-1)
Distortion factor at Pn	< 3%
Reactive power factor (cos phi)	ca. 1
Grid voltage monitoring	according to DIN VDE 0126-1-1
Earth fault protection	RCD (according to DIN VDE 0126-1-1)
Insulation, frequency and DC current monitoring	integrated according to DIN VDE 0126-1-1
Required phases, number of grid connections	3 (L1, L2, L3, N, PE)
Number of feed-in phases (230 V single-phase)	3

Performance	
Stand-by consumption	< 4 W
Night-time consumption	0 W
Maximum efficiency	97,5%
European efficiency	97,0%
MPP efficiency (static)	99,90%
Switching concept	HERIC® topology, three-phase, transformerless

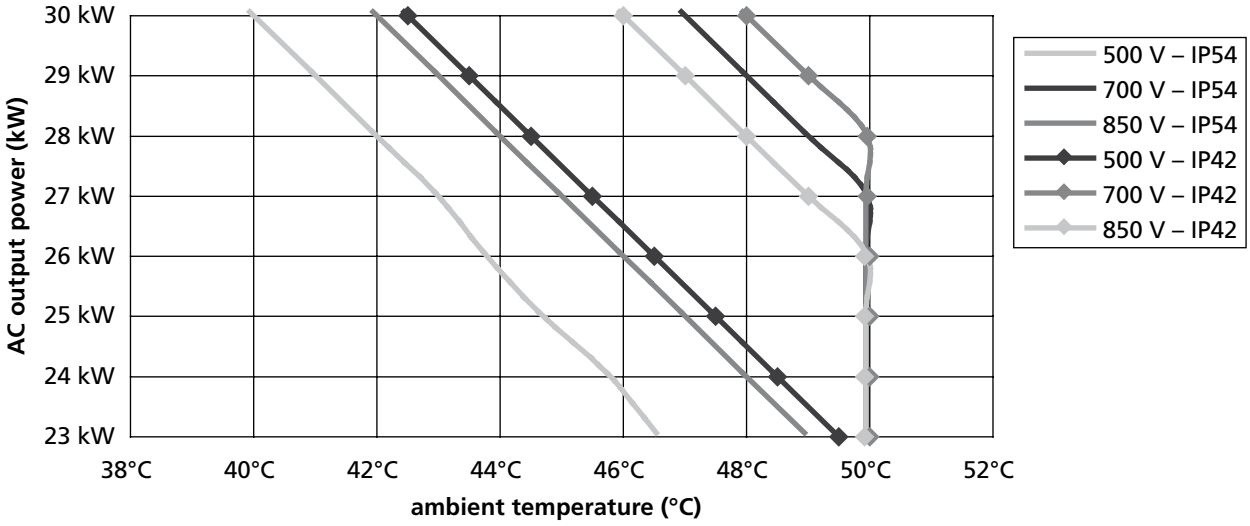
Other

DC switch	integrated
Grid-connection fuse layout	3 x 63 A (16 mm²)
Data interfaces	Ethernet, CAN, voltageless alarm relay, S0 pulse output, modem
Sensor interfaces	irradiation, temperature
Display	LCD, backlit, 128 x 64 pixels
Plant supervision	active alarm via e-mail, Sunways Browser, Sunways Portal
Power supply unit protected on PCB	T2A/250 V
IP degree of protection according to IEC 60529	IP 42 / IP 54 (optional)
Max. relative humidity	95%
Cooling	active cooling with fan
Ambient temperature	-20°C...40°C (at full load)
Overload behaviour	working point adjustment
Dimensions (height x width x depth)	100 x 60 x 40 cm
weight	155 kg
Type of installation	standing installation
Noise development	ca. 72 dB(A)
Standard warranty (option)	5 years (with maintenance contract: up to 20 years)
Certificates	CE, DIN VDE 0126-1-1

8.2 Derating curves

The derating curves describe the relationship between the AC output power of the Solar Inverter and the ambient temperature. The AC output power decreases with increasing ambient temperature.

Derating curves PT 30k

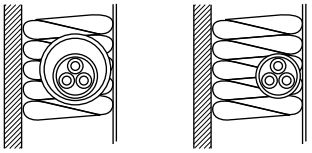
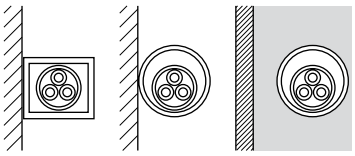


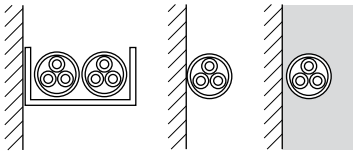
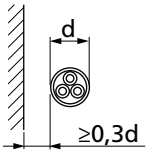
8.3 Installation methods and cable cross-sections

This IS an overview of the content of DIN 0294-8/ EN60204-1. The information contained in the standard is relevant and must be used.

- The data are based on an ambient temperature of 30°C according to test conditions and a cable temperature of up to 70°C.
- Number of wires under load: 3
- Line accumulation must be taken into account.

Reference installation methods A2, B2, C, E for fixed installation of cables and lines in and on buildings according to DIN VDE 0298-4/2003:

Installation method	Diagram	Rated current for the LS switch		
		10 mm² Cu	16 mm² Cu	25 mm² Cu
Installation method A2 · Installation in thermally insulated walls · Multi-core or sheathed cables · Electrical conduits or ducts · Direct installation		-	-	63 A
Installation method B2 · Installation in electrical conduits or enclosed electrical service ducts on or in walls, or in ducts for underfloor installation · Multi-core or sheathed cables		-	63 A	80 A

Installation method	Diagram	Rated current for the LS switch		
		10 mm² Cu	16 mm² Cu	25 mm² Cu
Installation method C · Direct installation on or in walls/slabs or in cable troughs · Multi-core or sheathed cables		63 A*	80 A	100 A
Installation method E · Installation in air, on support cables or on cable racks and brackets · Multi-core or sheathed cables		63 A*	80 A	100 A

*) not applicable for installation on wooden walls

8.4 General liability disclaimer

Although information contained in this manual has been checked with the greatest care for its accuracy and completeness, not liability whatsoever can be accepted for errors or omissions.

- Sunways AG reserves the right to change the hardware and software features described here at any time without prior notice.

- This manual may only be reproduced, passed on, copied or translated into other languages in whole or in part in any form or with any means the prior written approval of Sunways AG.

- Sunways AG shall assume no guarantee for damage caused by faulty or lost data, due to incorrect operation or the malfunction of the Solar Inverter, the software, additional devices or PCs.

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